SOCIAL IMPACT ASSESSMENT

FOR

DUNDEE PRECIOUS METALS TSUMEB SMELTER EXPANSION PROJECT

OSHIKOTO REGION

NAMIBIA

Originally prepared for

SLR Environmental Consulting (Namibia)(Pty) Ltd

By

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By

SLR Environmental Consulting (Namibia) (Pty) Ltd

EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

SLR Environmental Consulting (Namibia) (Pty) Ltd (SLR) was appointed by Dundee Precious Metals as the lead consultant to manage the Amendment Environmental Impact Assessment (EIA) process for the proposed expansion of the existing Tsumeb smelter located in the town of Tsumeb, in the Oshikoto Region in northern Namibia.

Tony Barbour Environmental Consulting was appointed by SLR to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. Following a 2017 public review, the 2017 version of the report has been updated by SLR. This updated report thus contains the findings of the SIA undertaken as part of the Assessment Phase of the EIA process and additional information from follow-up consultation and baseline sources.

APPROACH TO THE STUDY

The approach to the SIA study is based on South Africa's Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice. The key activities in the SIA process embodied in the guidelines include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the settlements and communities likely to be affected by the proposed project;
- Collecting baseline data on the current social and economic environment;
- Identifying and collecting data on the key potential social issues associated with the proposed project through consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention; and
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties; and
- Experience of the author with similar projects.

In addition, the relevant EBRD Performance Requirements were also considered.

ZONE OF INFLUENCE

The Zone of Influence of the proposed project has been determined to include:

- Oshikoto as the administrative region in which the Project is situated for broader planning frameworks;
- The Municipality of Tsumeb as the directly affected governance structure responsible for delivery of basic services (including health and basic education) and where Project activities occur;

- Fence-line communities of Ondundu and Northern Town industrial (Tophsop) area in particular which, according to the Community Health Impact Assessment (HIA) and Air Quality Impact Assessment (AQIA) are more vulnerable when considering the Smelter Expansion emissions and where expectations of socio-economic benefits are likely to be highest; and
- Walvis Bay as the port of entry for the concentrate and from where material is transported to the Smelter.

SUMMARY OF KEY FINDINGS

The key findings of the study with regard to the proposed expansion project are summarised under the following sections:

- Fit with policy and planning ("planning fit");
- Construction phase impacts;
- Operational phase impacts;
- Decommissioning phase impacts;
- No-development option.

FIT WITH POLICY AND PLANNING

Based on the findings of the review the proposed expansion of the DPMT smelter is supported by Vision 2030, the National Development Plan 4 (NDP4) and the Industrial Policy, which also promotes the development of Namibia as an industrialised nation. The expansion programme also supports two key objectives of NDP4, namely the achievement of faster and sustainable economic growth and the creation of employment opportunities. Therefore, provided that the proposed smelter expansion does not result in unacceptable environmental and socio-economic impacts, specifically health impacts, it is reasonable to assume that the proposed DPMT smelter expansion is supported by and supports the relevant key policy and planning requirements for Namibia.

CONSTRUCTION PHASE

The key social issues associated with the construction phase include:

Potential positive impacts

- Creation of temporary employment and business opportunities and opportunity for skills development and on-site training.

The construction phase is expected to extend over a period of ~ 18-24 months and to create ~ 185 person years of temporary employment opportunities[1]. The work associated with the construction phase will be undertaken by contractors. Execution of expansion project will be done in two phases. For the first phase (6 months) peak

[1] According to the Economic Specialist Report, "a person year is equivalent to the amount of work performed by an average full-time worker during the course of one year. This estimate does not specify the average number of people who will be employed at any given time during construction, a figure which will probably vary considerably, with more workers at some times and less at others. Most of the construction phase jobs will be in the medium skill (100 person-years) and high skill (57 person-years) categories, with 29 person-years' worth of the employment requiring people with a low level of skill. This is due to the highly technical nature of the construction." (Economic Specialist Report, van Zyl and Kinghorn, 2017)

construction employees is estimated at 110 - 120, and for the second phase (8 months peak construction employees is estimated at 50 - 60. In terms of skills levels, the majority of the construction phase jobs will be available to medium skilled (99) and high skilled (57) personnel, with the remainder (29) being available to lower skilled personnel. The high number of required skilled personnel is due to the technical nature of the project. It is therefore reasonable to assume that the potential employment opportunities for local community members from Tsumeb and the Oshikoto Region will be limited. The total wage bill for the construction phase is estimated to be in the region of N$ 53 million. Of this total, N$ 2.8 million would be earned by low skilled workers, N$ 24.8 million by medium skilled workers and N$ 25.5 by high skilled workers. A percentage of the wage bill will be spent in the local economy, which will benefit local businesses. This benefit will be confined to the construction phase.

The capital expenditure associated with the construction phase will be in the region of N$ 722 million (2016 values). In addition to the employment benefits, the expenditure of N$ 722 million during the construction phase will create business opportunities for the regional and local economy. The majority of benefits are likely to accrue to engineering and construction companies based in Windhoek and possibly South Africa. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be largely linked to accommodation, catering, cleaning, transport and security, etc. In terms of accommodation, the construction workers from outside the area will need to be accommodated in Tsumeb, which will benefit the local hospitality sector. The local hospitality industry will also benefit from the accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives, etc.) and other personnel involved in the project. Experience from other construction projects indicates that the potential opportunities are not limited to onsite construction workers, but also to consultants and product representatives associated with the project.

Potential negative impacts

- Impacts associated with the presence of construction workers on local communities.

These negative impacts may relate to the potential conduct of outside construction workers causing social problems linked to increases in alcohol and drug use, crime levels, unwanted pregnancies and sexually transmitted diseases. Based on the findings of the SIA, the significance of the potential negative social impact with mitigation was assessed to be of Low significance. Table 1 summarises the significance of the impacts associated with the construction phase.

Table 1: Summary of social impacts during construction phase

Impact	Significance No Mitigation	Significance With Mitigation
Creation of employment and business opportunities	Medium (Positive impact)	Medium (Positive impact)
Presence of construction workers and potential impacts on family structures and social networks	Medium (Negative impact)	Low (Negative impact)

OPERATIONAL PHASE

The key social issues affecting the operational phase include:

Potential positive impacts

- Creation of employment and business opportunities and support for local and national economic development. The operational phase will also create opportunities for skills development and training;
- Benefit for DPMT Community Trust and town of Tsumeb; and
- Catalyst for investment and development.

Employment and business

Although the expansion project will only create additional job opportunities for two contractors, the plant currently employs 667 direct jobs which makes DPM the largest single employer in Tsumeb. Of this total, 407 (61%) of the jobs are for low skilled workers, 169 (25%) are for semi-skilled workers, and the remaining 91 (14%) are for skilled workers. DPMT therefore address a key need in the local economy, namely the provision of employment for low skilled workers. The total wage bill associated with the smelter is in the region of N$168 million. The majority of the annual salary bill will be spent in the local Tsumeb economy, which represents a significant benefit for local businesses.

In terms of employment, the bulk of additional employment opportunities resulting from the expansion will be associated with indirect job opportunities. This is linked to increased expenditure by DPMT in the local area and region on items such as transport and handling services, engineering services and supplies, etc. A key beneficiary of the expansion will be the transport sector. Concentrate is imported to Namibia via the Port of Walvis Bay. From here it is transported either via road or by rail to Tsumeb for processing. The final product is then transported back to Walvis Bay for export.

In addition to the benefits to the local transport sector, local companies that provide engineering and maintenance services will also benefit from the expansion programme. The Tsumeb Municipality will also benefit from the expansion. The municipality currently generates ~ N$2.7 million per year from water sales to DPM. This is expected to increase by ~ 20% due to the proposed expansion.

The local hospitality industry in Tsumeb will also benefit from the operational phase of the expanded smelter. In this regard senior management and contractors providing services to the smelter will require accommodation when they visit Tsumeb. These representatives will stay over in local hotels, etc. The expansion of the DPMT smelter will therefore create a number of downstream benefits for both the local and national economy, which in turn will create employment and business opportunities.

Catalyst for development

Representatives from the Tsumeb Municipality, Oshikoto Regional Council, Namibian Chamber of Commerce, Tsumeb Community Concerns Committee, Youth leaders and the National Union of Miners all indicated that the investment by DPMT in Tsumeb had had a significant positive impact on the town and the region. In this regard the N$3 billion up-grade of the smelter and the associated 667 permanent jobs were viewed by a number of the respondents as the catalyst for recent establishment of the Tsumeb Mall and investment in the Kupferquelle Resort. DPMT are also seen as the best company to work for as they pay the best wages and have the best pension

and worker benefit schemes. This is despite the potential health risks associated with the operation of the smelter. The investment by DPMT also provided the catalyst for TransNamib to upgrade the railway line been Tsumeb and Windhoek. TransNamib also invested in new rolling stock to meet the needs of DPMT and enable it to transport concentrate from Walvis Bay to Tsumeb.

Tsumeb Community Trust

The feedback from key stakeholders, including representatives from the Tsumeb Municipality, Namibian Chamber of Commerce, Tsumeb Community Concerns Committee and Youth leaders, all indicated that the Tsumeb Community Trust (TCT) had had a significant benefit for the town. The TCT had also raised the profile of DPMT within the community and the town.

Potential negative impacts

The key social impacts identified by the SIA relate to community and worker health. A comprehensive Health Impact Assessment (HIA) and Air Quality Impact Assessment (AQIA) have been undertaken as part of the EIA. The key findings of these studies are referred to when discussing the issues and concerns raised. The focus of the assessment is on the potential impact on the broader community as opposed to worker health. This aspect is dealt with in detail by the Health Impact Assessment. Other negative impacts include:

- Impacts associated with storage and transport of concentrate.

Community health

The potential health impacts associated with SO_2 and H_2SO_4 emissions was raised as the key concern by the majority of stakeholders interviewed as part of the SIA. While all of the stakeholders interviewed acknowledged that conditions had improved since the establishment and commissioning of the sulphuric acid plant in late 2015-early 2016, it became clear that local residents were still exposed to emission related incidents on a weekly basis. In this regard a wide range of stakeholders and community members indicated that they were exposed to smell and associated health (coughing, sore throats, stinging eyes, etc.) impacts associated with SO_2 and H_2SO_4 emissions on a weekly basis (1-3 times a week). These findings were confirmed by the findings of the HIA and AQIA.

The findings of the AQIA found that SO_2 emissions will increase by 83%, PM_{10} emissions are expected to increase by 18%, arsenic emissions by 53% and H_2SO_4 emissions by 42%. These increases were, however, based on a conservative assessment that assumed that no emissions capture would take place. Despite these significant increases the findings of the dispersion simulations indicate that these levels largely would not exceed off-site air quality limits or screening criteria for SO_2, PM_{10} and H_2SO_4 for the proposed smelter expansion from 240 000 t/a to 370 000 t/a. The findings of the HIA also indicate that the impact on the community will be acceptable.

While the projected emission levels for SO_2 and H_2SO_4 may not exceed accepted standards and therefore are not regarded as a health threat, the findings of the HIA indicate that "It is evident that there is an appreciable burden of physical effects of the SO_2 exceedances on the exposed population". Based on the information contained in the AQIA it is clear that, in terms of emissions, a larger area will be affected by the expanded production. Based on this it is reasonable to assume that the frequency of incidents that result in asthma related symptoms and odours is

therefore likely to increase unless effective measures are taken to manage the increase in emissions linked to the expansion of the smelter.

While the findings of the AQIA and HIA study are not disputed, the public are also likely to find it extremely difficult to understand how an increase in SO_2, PM_{10}, arsenic and H_2SO_4 emissions by 63%, 33%, 51% and 54% respectively will not result in any change in the significance of the air quality and health impacts.

In this regard the National Union of Miners (NUM) indicated that they would not support the proposed expansion unless the potential health risks associated with current and future operation of the smelter can be effectively addressed. Given the findings of the HIA and the SIA it is recommended that a more detailed set of mitigation measures be prepared describing what steps will be taken to guarantee that the proposed 54% increase in production will not result in an increase of exposure exceedances. DPMT should also provide guarantees that the frequency and severity of SO_2 and H_2SO_4 emissions will not increase as a result of the smelter expansion programme. DPMT should also establish an Environmental Monitoring Committee as per the recommendations contained in the SIA.

Storage and transport of concentrate

The potential impacts associated with the transport of concentrate from the Port of Walvis Bay to Tsumeb are linked to safety issues posed by large trucks and dust. However, while the volume of heavy traffic along the road between Walvis Bay and Tsumeb is therefore likely to increase, this increase is supported by the vision to establish Namibia as an International Logistics Hub. The road and rail upgrades identified in the Logistics Master Plan will also assist to reduce the potential impacts. Increasing the percentage of concentrate transported by rail would also significantly reduce the potential safety risks posed to other road users. The use of rail will also reduce the damage to roads caused by heavily loaded vehicles. This would represent a social benefit for other road users.

The significance of the impacts associated with the operational phase are summarised in Table 2.

Table 2: Summary of social impacts during operational phase

Impact	Significance No Mitigation	Significance With Mitigation
Creation of employment, business and economic development opportunities	High (Positive impact)	High (Positive impact)
Benefits associated with Community Trust	Medium (Positive impact)	Medium (Positive impact)
Catalyst for investment and development	High (Positive impact)	High (Positive impact)
Health impacts associated with SO_2 and H_2SO_4 emissions	Medium (Negative)	Low (Negative)
Impacts associated with storage and transport of concentrate	Medium (Negative)	Low (Negative)

NO DEVELOPMENT OPTION

The No-Development option would represent a lost opportunity for Tsumeb, the Oshikoto Region and Namibia to benefit from the employment and economic

opportunities associated with the expansion of the DPMT smelter. This loss would represent a significant negative social impact for the local community, especially in an area of Namibia where employment opportunities are limited. Support for the development is, however, contingent upon effectively addressing health risks to the local community and workers.

However, it should be noted that the current operation of the smelter also creates significant socio-economic benefits and that these benefits will continue if the expansion programme does not proceed.

DECOMMISSIONING PHASE

The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. Given the relatively high number of permanent employees (667), the potential impacts associated with decommissioning can be significant.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the SIA, the proposed expansion of the DPMT smelter will create economic opportunities for Tsumeb, the Oshikoto Region and the broader Namibia economy. The expansion of the smelter is therefore supported. In order to enhance the local employment and business opportunities, the mitigation measures listed in the report should be implemented. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented.

The key negative impact associated with the smelter expansion is linked to the health risks posed by the increase in emissions. While the findings of the HIA and AQIA indicate that the projected emission levels for SO_2 and H_2SO_4 will not exceed accepted standards and are therefore not regarded as a significant health threat, the findings of the HIA and SIA indicate that the residents of Tsumeb are exposed to weekly exposures of SO_2 and H_2SO_4. In this regard, the HIA notes that "there is an appreciable burden of physical effects of the SO_2 exceedances on the exposed population".

Therefore, while the findings of the AQIA and HIA study are not disputed, the public are likely to find it extremely difficult to understand how an increase in SO_2, PM_{10}, arsenic and H_2SO_4 emissions by 63%, 33%, 51% and 54% respectively will not result in any change in the significance of the air quality and health impacts.

Given the findings of the SIA and the HIA it is recommended that a more detailed set of mitigation measures be prepared describing what steps will be taken to guarantee that the proposed 54% increase in production will not result in an increase of exposure exceedances. DPMT should also provide guarantees that the frequency and severity of SO_2 and H_2SO_4 emissions will not increase as a result of the smelter expansion programme. This guarantee should be informed by a detailed and effective set of mitigation measures. DPMT should also establish an Environmental Monitoring Committee as per the recommendations contained in the SIA.

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ACRONYMS

AQIA	Air Quality Impact Assessment
CBD	Central Business District
CIP	Community Investment Policy
CSI	Corporate Social Investment
DEA&DP	Department of Environmental Affairs and Development Planning
DPMT/ Company	Dundee Precious Metals Tsumeb
EBRD	European Bank of Reconstruction and Development
EMS	Environmental Management System
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
Expansion Project or Project	Smelter Expansion Project
GBV	Gender-Based Violence
HIA	Health Impact Assessment
HSE	Health Safety and Environment
IOM	International Organisation for Migration
LM	Local Municipality
NDP	National Development Plan
NGOs	Non-Governmental Organizations
OH&S	Operational Health and Safety
PR	Performance Requirement
EBRD PRs	EBRD's Performance Requirements
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
TCT	Tsumeb Community Trust
tpa	tons per annum
ZOI	Zone of Influence

1 INTRODUCTION

1.1 Background

SLR Environmental Consulting (Namibia)(Pty) Ltd (SLR) was appointed by Dundee Precious Metals Tsumeb (DPMT) as the lead consultant to manage the Amendment Environmental and Social Impact Assessment (ESIA) process for the proposed expansion of the existing Tsumeb smelter (hereafter referred to as the Expansion Project, or Project) located in the town of Tsumeb, in the Oshikoto Region of northern Namibia. Figure 1 shows the site within the context of Namibia and Figure 2 provides a more detailed view of the existing operations including the Smelter complex and adjacent town of Tsumeb.

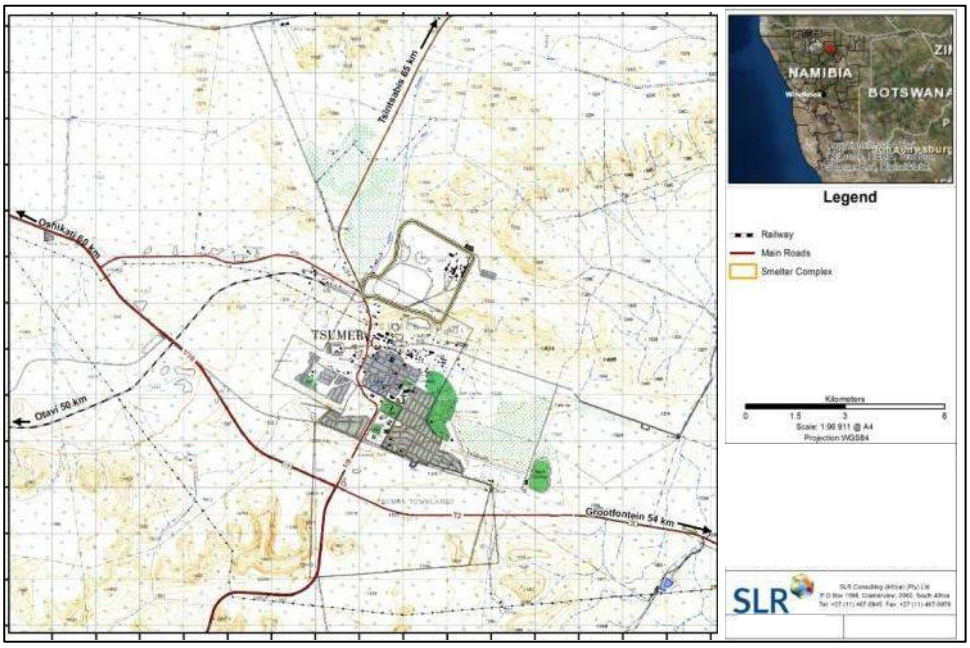


Figure 0.1: Project Footprint within National Context
(Source: Golder Associates 2013)

Figure 2: DPMT Smelter Complex and Tsumeb Town
(Source: Google Earth)

The ESIA was to be undertaken to meet requirements of the Namibian environmental legislation and Department of Environmental Affairs and Tony Barbour Environmental Consulting was appointed by SLR to undertake a specialist Social Impact Assessment (SIA) as part of the ESIA process in 2016. Following the completion of the Assessment and a 2017 public review process, additional international requirements, specifically those of the European Bank of Reconstruction and Development (EBRD), were added as a framework with which the ESIA was to comply.

This report thus contains the findings of the SIA undertaken as part of the Assessment Phase of the ESIA process and additional information from follow-up consultation, desk-top searches and baseline sources.

1.2 Terms of Reference

The original terms of reference for the SIA required:

- A description of the environment that may be affected by the proposed activity and the manner in which the environment may be affected;
- A description and assessment of the potential social issues associated with the proposed smelter upgrade project and the associated alternatives;
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts; and

Additional criteria were set to meet the requirements of both national legislation and the EBRD PRs of an SIA commensurate with the scale and complexity of the proposed Expansion Project.

1.3 Report Structure

The report is divided into the following sections:

- Section 1: Introduction
- Section 2: Project Description
- Section 3: Methodology
- Section 4: Regulatory Environment
- Section 5: Socio-economic Context
- Section 6: Identification and Assessment of Key Issues
- Section 7: Key Findings and Recommendations.

1.4 Assumptions and Limitations

1.4.1 Assumptions

It is assumed that the technical data provided by DPMT and its project team are accurate.

1.4.2 Limitations

The demographic data used in the study is largely based on the 2011 Census. Some of this data may be out-dated. However, this will not have a bearing on the key findings of the SIA. According to the Tsumeb Municipality, there is insufficient capacity to undertake regular community surveys in order to update baseline demographic and needs information for the municipal area. For the updating of this information there is a large dependence on the input of private companies (pers. comm., Mr G. Kearns).

1.5 Specialist Details

The author of this report is an independent specialist with 24 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 200 SIA's and is the author of the Guidelines for Social Impact Assessments for EIA's adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape, South Africa, in 2007. Tony Barbour has also undertaken the specialist SIA studies for a number of mining related projects in Namibia.

1.6 Declaration of Independence

This confirms that Tony Barbour, the specialist consultant responsible for undertaking the study and preparing the SIA Report, is independent and does not have vested or financial interests in the proposed DPM Tsumeb Smelter Expansion Project either approved or rejected.

2 PROJECT DESCRIPTION

2.1 Expansion Project Overview

The original Tsumeb smelter was established by the Tsumeb Corporation Limited (TCL) in 1963 to process concentrate from the adjacent copper mine which had been in operation since 1906. The Tsumeb smelter was specifically designed to treat complex concentrates, and was acquired by Dundee Precious Metals (DPM) in 2010 with the objective of treating copper concentrate mined at DPM's Chelopech gold and copper mine in Bulgaria, which is the largest underground gold-copper mine in Europe. The mine produces copper concentrate with high gold, silver and arsenic content. The Tsumeb smelter currently also receives copper concentrate from El Brocal in Peru and Opuwo in Namibia. The copper concentrate from Peru and Bulgaria arrives through Walvis Bay, is transported 530 kms and is smelted exclusively at Tsumeb to produce a 98.5% pure blister copper which also contains gold and silver.

Since 2010, Dundee Precious Metals Tsumeb (DPMT) has embarked on a modernization and expansion programme aimed at increasing production and improving the plant's environmental performance. This has, amongst others, included the following projects:

- Construction of a hazardous waste disposal site (2012);
- Addition of a second oxygen plant (2012);
- Improvement of the off-gas handling systems (2012-2013);
- Closure of the reverberatory furnace (2013);
- Addition of a 1,540 t/d sulphuric acid plant (2015);
- Addition of two new and larger 13 ft by 30 ft Peirce-Smith converters (2015);
- A new effluent treatment plant and sewage treatment plant; and
- Decommissioning of the arsenic plant and discontinuation of arsenic trioxide production (2017).

The above measures have increased its capacity to an annualized rate of 240,000 tons per annum (tpa) of copper concentrates. The new oxygen plant and acid plant have capacity to treat up to ~400,000 tpa of concentrate. However the current capacity of the Ausmelt feed and furnace represent a bottleneck to future expansion. With additional custom concentrates available and further areas for operational improvements identified, DPMT is planning to expand the current operations from 240 000 to 370 000 tpa. In order to achieve this increase in production the following actions will be implemented as part of the Smelter Expansion Project.

- Upgrading of the Ausmelt feed and furnace;
- Installation of a rotary holding furnace (RHF);
- Implementation of slow cooling of the RHF and converter slag;
- Upgrading of the slag mill to improve copper recovery and handle the increased tonnage from slow cooled slags;
- Option to install an additional Peirce-Smith (PS) converter; and.
- Additional related infrastructure and utility upgrades (air, water and electricity supply).

It is important to note that the expansion described below will not include any additional landtake or change to the existing operations' footprint.

2.2 Associated Facilities

Expansion activities are proposed at the Tsumeb site. However, if the Project goes ahead it will mean that additional concentrate will be brought to the smelter. The concentrate will continue to be shipped to Namibia and offloaded at the Walvis Bay Port from where it will be transported by truck and rail (TransNamib railways) to Tsumeb. Four transport companies currently transport ore from Walvis Bay to Tsumeb (Coleman Transport, Bokkie Transport, LMH and Blaauws). Between them they average about 120 trips per week. An estimated increase of copper concentrate imported of approximately 50%, and export quantities increasing accordingly, means an additional ~60 trucks travelling per week. This would likely lead to an increased number of job opportunities linked to truck transport. TransNamib rail is also used to transport concentrate, ~ 7 000- 10 000 tonnes per month. It is being considered to increase the volumes to be transported by rail in future.

The increase in production will also impact on the handling and storage operations at the Port of Walvis Bay, which are managed by Grindrod. The facility has been in operation since 1995 and employs 26 staff. Operations on the site are monitored by Namport. The facility is ISO 14 000, 18 000 and 9 000 certified, so is a well-run operation. With the proposed increase throughput capacity, additional employment opportunities would likely be created at the storage and handling facility.

2.3 Environmental and Social Management Systems

Current Dundee operations at Tsumeb are managed through an integrated Health Safety and Environment (HSE) Management System combining three accredited ISO standards namely: ISO 14001:2015 (Environmental Management System (EMS)), ISO 45001:2018 (Operational Health and Safety (OH&S)) and ISO 9001:2015 (Quality Management System).

The integrated system aims to ensure that requirements of all three ISO standards are complied with and that the overall HSE performance is improved. Discussions with DPMT's Health and Safety and Environment managers confirmed that the Company is being structured to facilitate compliance and environmental performance. Current Dundee environmental functions and activities have been aligned with the requirements of the integrated structure. The HSE Management System is currently in the implementation phase.

3 METHODOLOGY

3.1 Approach to the SIA

The approach to the SIA study is based on South Africa's Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international good practice. The key activities in the SIA process embodied in the guidelines include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;
- Collecting baseline data on the current social environment and historical social trends;
- Identifying and collecting data on the SIA variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention (Annexure A contains a description of how social impacts are identified and understood within the SIA methodology used for this Assessment); and
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of project information provided by the client;
- Review of demographic data from available sources;
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visit to the area and interviews with interested and affected parties; and
- Review of the findings of key specialist studies undertaken as part of the EIA process, specifically the Community Health Impact Assessment (HIA) and the Air Quality Impact Assessment (AQIA).

The identification of potential social issues associated with the proposed project is based on observations during the project site visit, information provided during interviews conducted and review of relevant documentation. Annexure B contains a list of the secondary information reviewed and interviews conducted. Annexure C summarises the assessment methodology used to assign significance ratings to the assessment process.

The site visit to Tsumeb took place from 16-21 May 2016. In addition the quay side operations in Walvis Bay Harbour were also visited on 23 May 2016. The meetings in Tsumeb were set up and organized by Mr Isai Nekundi and Mr Mike Heita from DPMT.

A list of the key groups and individuals consulted during the site visit is provided in Annexure D below. The groups met with included Non-Governmental Organizations (NGOs), municipal representatives, community representatives, employee representatives and residents and institutions located in close proximity to the smelter site and considered to be most likely to be affected by smelter activities and related emissions. Meetings were also held with key DMPT staff. The aim of these meetings was to collect information on operations at the smelter, wage bills,

operational budgets, procurement policies, supply chain opportunities, worker health and safety, employee benefit schemes, etc.

3.2 Zone Of Influence

In determining the scope of the study a Zone of Influence (ZOI) of the proposed project has been determined to include:

- Oshikoto as the administrative region in which the Project is situated for broader planning frameworks;
- The Municipality of Tsumeb as the directly affected governance structure responsible for delivery of basic services (including health and basic education) and where Project activities occur;
- Fence-line communities of Ondundu and Northern Town (Topshop) areas in particular which, according to the Community Health Impact Assessment (HIA) and Air Quality Impact Assessment (AQIA) are more vulnerable when considering the Smelter Expansion emissions and where expectations of socio-economic benefits are likely to be highest; and
- Walvis Bay as the port of entry for the concentrate and from where material is transported to the Smelter.

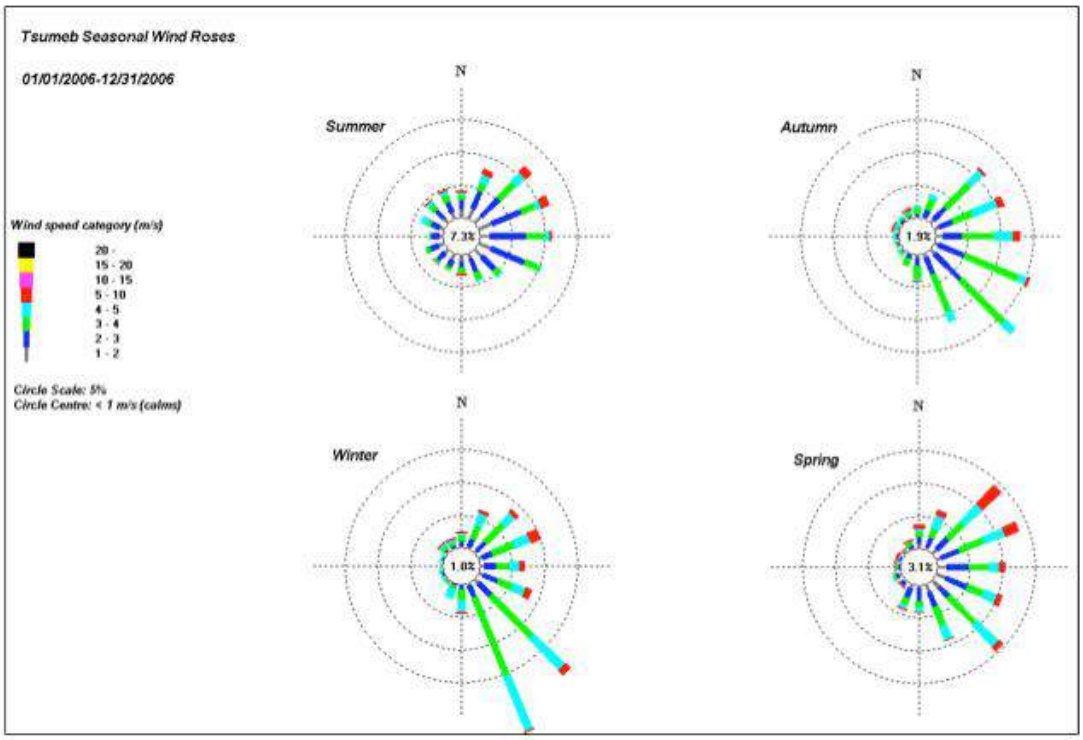
The HIA provides a valuable approach to conceptualizing a disaggregation of the fenceline residential areas within Tsumeb based on levels of exposure to air quality impacts from the existing operations. An extract from the HIA states "The town is situated to the south of the smelter precinct and separated by a hill. The prevailing wind direction is from the North East and South East (see Figure 3). The North East wind blows dust and gas over the Northerly and North Westerly parts of Tsumeb." The report goes on to say "The entire community living in Tsumeb is affected by the operations of the smelter including people living on farms to the North and North West of Tsumeb town. Within Tsumeb, populations particularly likely to be affected are those at closest proximity to the smelter precinct which is immediately adjacent to the northern edge of town separated by a hill. The prevailing wind direction is Easterly with South Easterly and North Easterly winds predominating. Smelter emissions are driven westwards and alternatively northwards and southwards affecting the western industrial area and the northern part of town including Ondundu and the farms to the North West.

Based on the results of the HIA and AQIA the following exposure zones were identified (see Figure 4):

- **High exposure zone (shown in red) -** Western industrial area and the Northern Town industrial area. Both are not residential.
- **Medium exposure zone (orange) -** Endombo residential area to the West which is separated by a small hill form the Western Industrial Area and located at the Northern edge of Nomtsoub; and the Ondundu residential area to the East which abuts the hill on the other side of which is the smelter's waste disposal site. Together referred to as **Town North**.
- **Low exposure zone (yellow)**
    - The residential areas to the South of this zone comprising Nomtsoub to the West and the Eastern suburbs of Tsumeb collectively as **Town Central**.

- The area known as Kuvukiland to the South West of the town and furthest from the smelter was considered to be an even lower exposed area (but still yellow in the map) and is referred to as **Town South**.
- The last area is that of the **NAMFO** farms to the North West of the smelter and also in the path of wind dispersion of pollutants but further away from the smelter. Many farmworkers live and work there together with their families."

(HIA Dundee Smelter Expansion Project, 2018)



Source: Airshed Planning Professionals (2011)

Figure 3: Wind roses showing seasonal wind direction
(Source: HIA Dundee Smelter Expansion Project, 2018)

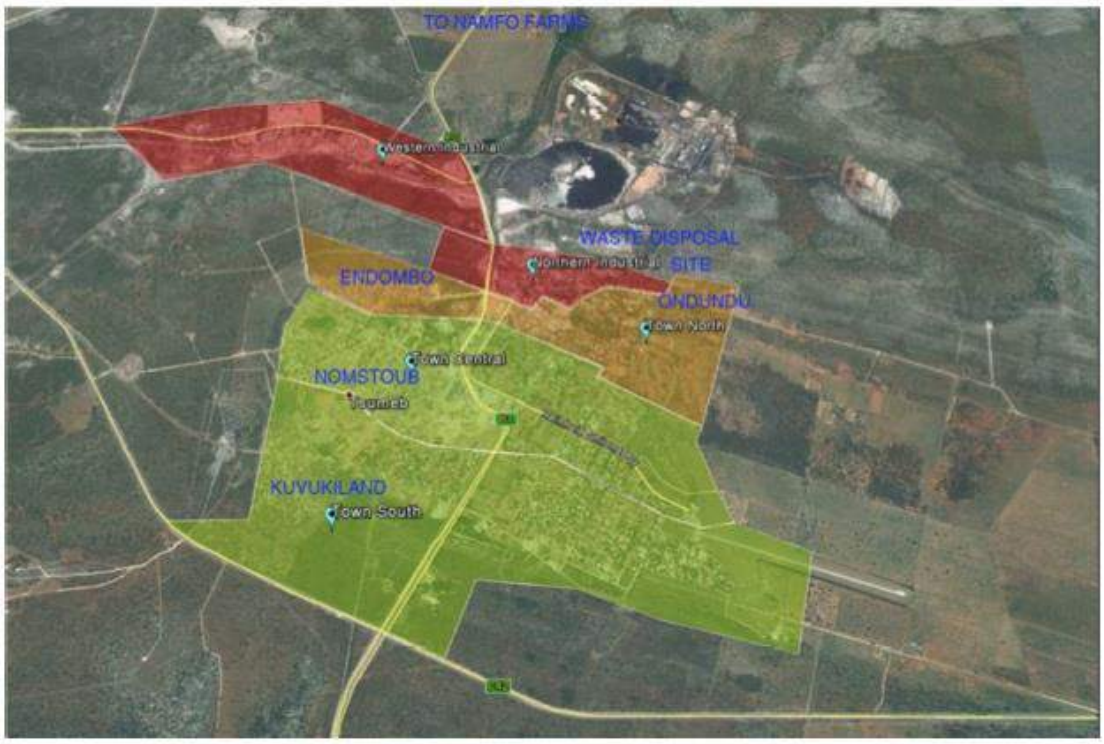


Figure 4: HIA exposure zones and residential Tsumeb suburbs
(Source: HIA Dundee Smelter Expansion Project, 2018)

Based on the above discussion, the informal settlement of Kuvukiland has specifically not been included into the SIA ZOI as the HIA and AQIA suggest it to be a significant distance from the smelter and thus not directly impacted by air or noise pollution. The ZOI, as outlined above, has been defined by its direct impact from proposed expansion activities.

3.3 Stakeholder Engagement

Stakeholder engagement was undertaken at various times across the ESIA and by different specialist study teams including the HIA, Economic Specialist study, AQIA and ESIA. Not directly related to the DMPT ESIA but feeding into it is the Needs Assessment (2015) undertaken to assist Dundee in decision-making around its Corporate Social Investment in the area. Engagements with various stakeholders during the Needs Assessment have also been taken into account when determining different stakeholder groups and in understanding levels of vulnerability amongst potentially impacted stakeholders.

The list of stakeholders directly engaged as part of this SIA is presented in Annexure D. Decisions on engagement were based on the ZOI.

Currently DPMT has "Receiving Suggestions, Opinions and Grievances Procedure" that outlines the process of receiving opinions, suggestions and grievances from the community. The DPMT Information Centre is available for the general public to submit grievances, and DPM has a "Speak Up" process which is available to internal

and external parties. This process provides a direct connection to the Chair of the HSE and Audit Committee. DPMT is also in the process of revising their Stakeholder Relationship Management and Engagement Framework whereby local communities and other interested parties are informed of operations at the smelter and are invited to voice grievances.

Stakeholder engagement for the SIA has focused on key informants and focus group meetings (FGM) with groups and individuals categorised below:

- Authorities (Regional and municipal)
- DPMT Representatives;
- Youth structures;
- Business representatives in Tsumeb and Walvis Bay;
- Labour organisations/ unions;
- Private educational and health institutions;
- Community organisations and structures;
- Farming concerns; and
- Local residents.

It is proposed to make the revised ESIA and appendices available for review for a period of 14 days. The ESIA will be made available to all the stakeholders on the current stakeholder database dated March 2019 (refer to Appendix C for the Interested and Affected Party Database) at the DPMT Info Centre, local library and the SLR website. Notifications will be sent via post, fax, email and sms.

Comments received will be responded to, and these will be reflected in the updated Issues and Responses Report prior to submission to the DEA

3.4 Dundee's Corporate Social Investment (CSI)

Beyond the immediate requirements of Stakeholder Engagement for the ESIA, Dundee is involved in other ongoing interventions. Dundee has a company-wide approach to CSI which is applied at the Tsumeb site. CSI, according to the 2015 Needs Assessment, is one of six core values. In summary, the relevant value says that the Company *cares about the quality of the communities in which it operates and wishes to leave behind a legacy that shows a contribution to residents which make the community a better place than before the Company arrived there. It states "We have a strong corporate and social responsibility to the communities in which we invest".*

Dundee has a Corprate Responsibility Policy adopted in 2018. This policy sets out commitmnets related to Social, Health and Safety and Environmental aspects and the policy forms is one of the Dundee's four strategic imperatives. From a social perspective Dundee is committed to the following:

- Respect human rights and avoid contributing to adversehuman rights impacts;
- Contribute to the development of vibrant communities and sustainable livelihoods;
- Engage openly with local communities, governments and other organizations to build and maintain trust-based relationships;
- Collaborate to support community health and wellness;

- Identify and address the social impacts of our activities throughout the business life cycle; and
- Respect the local culture and protect heritage resources.

The Company has a community investment policy (CIP) adopted in 2014. The CIP identifies two types of Community Investments: 1) Development Investment and 2) Donations (general, rapid response/good corporate citizen activities, volunteer-related donations).

Development investments are central to the CIP. The Needs Assessment Report states that these types of investments "are to account for *at least 75%* of the *Community Investment budget* annually. Development Investments are to *deliver a positive sustainable social impact*. Furthermore, Development Investments are to:
1) Create a long-term legacy of sustainable development;
2) Nurture, maintain and enhance the Company's social licence to operate;
3) Deliver positive sustainable social impact (e.g. building human and institutional capacity in education, health and wellness, employment, affordable housing) which have a long-term duration - 3-10 years;
4) Infrastructure projects with a sustainable development intent (e.g. school, kindergartens)." (Needs Assessment 2015)

Significantly the Company has identified the long-term planning (3-10 years) required for sustainable CIP implementation and is developing Key Performance Indicators (KPIs) against which to monitor and measure the value of its implementation.

4 REGULATORY ENVIRONMENT

4.1 Applicable International Requirements

As discussed above, this SIA is framed by international and national requirements when considering the potential impacts of the Expansion Project.

Internationally, the following EBRD PRs are considered relevant to this study:

PR 1: Assessment and Management of Environmental and Social Impacts and Issues - Focusing on identifying, evaluating, managing and mitigating social impacts and issues; the implementation of appropriate Environmental and Social Management Systems (ESMS) tailored to the nature of the Project and commensurate with the potential impacts identified; and recognising legacy and cumulative impacts of the Project.

PR 2: PR 2 Labour and Working Conditions - Particularly as they apply to local employment and procurement opportunities.

PR 4: Health and safety - Specifically considering social implications in Operational Health and Safety and Community Health and Safety. It's important to note here that a specialist Health Impact Assessment (HIA) has been undertaken as part of this ESIA and details from the study will be included into this report where relevant.

PSR5: Land Acquisition, Involuntary Resettlement and Economic Displacement – Considering issues of potential physical or economic displacement that may occur as a result of the impacts of expansion.

PR 7: Indigenous People – Understanding if any indigenous people will be impacted by the Project

PR 10: Information Disclosure and Stakeholder Engagement – As this applies to the process followed during the ESIA as well as ongoing planning for transparent engagement during Expansion implementation.

Application of these PRs and the scale of the SIA itself are commensurate with and proportional to the potential impacts and issues of the Expansion Project. The fact that the proposed project relates to an existing operating facility where expansion is to take place within the existing facility footprint has motivated for the SIA to focus on the additional impacts anticipated to accrue directly from the proposed expansion. Cumulative impacts arising directly from the expansion are also considered.

4.2 Relevant National and Regional Legislation and Regulations

The SIA also takes into account the national legal framework in which the Project takes place. Briefly, this includes:

Constitution of the Republic of Namibia 1 of 1990 **-** Actively promoting and maintaining the environmental welfare of Namibians by formulating and institutionalising policies that can realise sustainable development objectives and principles.

Environmental Management Act 7 of 2007 Responsible Authority: Ministry of Environment and Tourism Relevant Aspects - Aimed at promoting the sustainable management of the environment, establishing the Sustainable Development Advisory Council, and providing for a process of assessment and control of projects which may have significant effects on the environment. This Act also includes requirements for public hearings and notifications (Sec 17) and public consultation (Sec 21).

Government Notice 30 of 2012: Environmental Impact Assessment Regulations - Regulation 6 provides that an application for an environmental clearance certificate must be submitted to the relevant competent authority.

Road Traffic and Transport Act 22 of 1999 – Addressing the transportation of any such goods defined in the Act as "dangerous goods".

Labour Act (Act No 11, 2007) - Outlining the employer's duties to employees to include a working environment that is safe, without risk to the health of employees; and has adequate facilities and arrangements for the welfare of employees.
Regarding the broader neighbouring communities the employer must conduct its operations in a manner that, as far as is reasonably practicable, will ensure people not directly attached to operations are not exposed to safety or health risks.

Air Quality Guidelines and Standards - Namibia does not currently have its own Emission standards and therefore South African standards and international standards are generally used. A specialist AQIA has been undertaken as part of the ESIA. Further, issues of employee and community health are discussed in the HIA

Ambient Air Quality Guidelines - Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize their impacts through managing pollutant concentrations in emissions and that the contribution of particular emissions to the air-shed are within limits that recognise the need for future sustainable development.

4.3 PLANNING CONSIDERATIONS

Legislation and policy embody and reflect key societal norms, values and developmental goals. The legislative and policy context therefore plays a role in identifying and assessing the potential social impacts associated with a proposed development and their appropriateness in relation to national planning priorities. Beyond the legislative environment outlined above, a key component of the SIA process requires the assessment of the proposed development in terms of its consistency with key planning and policy documents of the area. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the key policy and development guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported. However if the development does conform to and support the relevant legislation and planning documents it can be supported.

4.3.1 Vision 2030

At a national, strategic long-term level, socio-economic development planning in Namibia is informed by Vision 2030 adopted in 2004, which states that the vision of

Namibia is for a "***prosperous and industrialised Namibia, developed by her human resources, enjoying peace, harmony and political stability".***

In terms of prosperity, the Fourth National Development Plan (NDP4) notes that all Namibian workers should earn a decent wage, which would enable them to live a life well above the poverty level. The section also notes that Namibians should be healthy and empowered.

This vision has eight major objectives namely to:

- Ensure social equality;
- Consolidate peace and political stability in the country;
- Develop competitive human resources and an efficient public sector;
- Develop a globally competitive economy;
- Provide a high standard of living for all;
- Ensure the sustainable development of the country's "natural capital";
- Achieve knowledge- and technology-based economic growth; and
- Achieve regional integration and international stability.

National Development Plans (NDPs) provide the main instruments to implement the policies and programmes to achieve the Vision. The 5th National Development Plan (NDP5 2018-2020), as with its predecessors, includes environmental sustainability as one of its four pillars of sustainable development. Significant to NDP5 is the addition from NDP4 of a detail focused on ensuring a sustainable environment and enhancing resilience. This is resented in the context of increasing awareness of and concern about natural resource utilization and climate change. NDP3 was geared towards the acceleration of economic growth and deepening rural development, and was considered to be the first systematic attempt to translate Namibia's overarching growth plan, Vision 2030, into concrete policies and actions. NDP3 was based on eight Key Result Areas (KRAs), each corresponding to one of the eight main objectives of Vision 2030. Due to their complexity and wide scope, two of the eight KRAs – Competitive Economy and Productive Utilisation of Natural Resources and Environmental Sustainability – were sub-divided into two Sub-KRAs each, giving a total of ten KRAs/Sub- KRAs.

In terms of supporting the productive utilisation of natural resources and environmental sustainability, specifically non-renewable resources NDP3 noted, that "as a primary resource based economy, Namibia relies heavily on natural resource extraction and utilisation thereof, which needs to be carried out in an efficient and sustainable manner, since the challenges of over-exploitation of both renewable and non-renewable resources could threaten continued economic prosperity", and the goal should be to ensure that "Namibia's mineral resources are strategically exploited and optimally beneficiated, providing equitable opportunities for all Namibians to participate in the industry; while ensuring that environmental impacts are minimised, and investments resulting from mining are made".

NDP3 also noted that the mining sub-sector was one of the major contributors to the Namibian economy in terms of economic output and exports. In addition to its economic importance, mining has stimulated significant infrastructural development and has been responsible for supporting a variety of community initiatives, conservation projects, training and skills development programmes, and various other social concerns in Namibia. NDP3 went on to note that if not planned or

managed appropriately, mining can result in a great variety of adverse impacts which threaten human health/life and environmental degradation.

Based on the NDP3 it is clear that mining has and will continue to play a key role in the Namibian economy. Mining as an economic sector is therefore supported at a national planning level.

4.3.2 Fourth National Development Plan (NDP4)

The NDP4 (2012-2017) highlights a number of values and principles adopted by Namibia and enshrined in various national documents, including the Constitution of the Republic of Namibia and Vision 2030. These values and principles have been taken into account during the NDP4 drafting process and inform the future development of Namibia. A number of these are relevant to and have a bearing on the DMPT smelter expansion project, namely:

Upholding the constitution and good governance
Upholding the constitution and good governance ensures that issues related to human rights, including the right to a clean and healthy environment, access to employment opportunities, equitable use of and access to productive resources, reducing environmental degradation and promoting sustainable economic development, can be achieved.

Access to finance Capacity enhancement
Investing in people and human resources is a crucial precondition for the desired social and economic transformation. Of relevance to the DPMT project the NDP4 notes that this includes education and training, including the promotion of science and technology, and the implementation of health and health-related programmes and policies. The DMPT smelter expansion project supports these requirements and objectives.

Comparative advantage
The NDP4 highlights the importance of capitalising on Namibia's comparative advantages and the provision of suitable incentives to enable the country's national resources to be utilised in the most efficient and sustainable way possible so as to create a safer, healthier and more prosperous future for all inhabitants. The DPMT smelter is one of only a few smelters in the world that are capable of processing complex copper ores.

People-centred economic development
The NDP4 stresses the importance of economic growth and diversification to achieve sustainable development and improve the welfare of the country's residents. Of relevance to the DMPT smelter expansion project the section refers to the key role played by expanding the industrial sector.

Gender equality and the empowerment of women
The NDP4 highlights the importance of gender equality as a prerequisite for sustainable development and the need to create and promote an enabling environment in which gender equality and the empowerment of women are realised. Gender equality is therefore a key issue that should be addressed in terms of employment and skills development opportunities associated with the DMPT smelter expansion project.

Environment and climate change

The NDP4 notes that the Namibian environment is clean and all efforts will be taken to ensure that it will continue to remain clean. Of relevance to the DPMT smelter expansion project the NDP4 notes that all elements of society, especially the business sector, must support and adopt the precautionary approach to environmental challenges and implement initiatives to promote greater environmental responsibility and encourage the development and use of environment-friendly technologies.

Sustainable development
The NDP4 fully commits the Namibian Government to the notion of sustainable development, i.e. the type of development that meets the needs of the present without limiting the ability of future generations to meet their own needs. The NDP4 notes that the principle of sustainable development is a cornerstone of Namibia's long-term vision.

Partnerships
The NDP4 notes that the Namibian Government is committed to creating an environment conducive to working together as a key to economic progress and social harmony. Of relevance to the DMP smelter expansion project this entails partnership between Government, the private sector and communities and other members of civil society, including community-based and non-governmental organisations.

The NDP4 notes that while Namibia has achieved positive growth the economy is still dependent on resources, including minerals. Despite some progress in areas such as tourism there has been less success in the field of services and manufacturing. This has impacted on the ability to address unemployment, poverty and income inequality. In order to address these challenges the NDP4 has three goals, namely:

- Faster and sustainable economic growth;
- The creation of employment opportunities; and
- Enhanced income equality.

In addition, the NDP4 focuses on a number of foundation issues, which are identified as issues that need to be in place in order to achieve the stated goals. These include:

- Maintenance of macroeconomic stability;
- Development and retention of superior skills needed by both the private and public sectors;
- Development of capacity to do research and development, and
- Making Namibia the preferred investment location in Africa.

The NDP4 highlights the importance to shifting from an economy dominated by agricultural output and employment to one dominated by manufacturing and local value addition. Industrialisation is therefore a key component of Namibia's economic development strategy. The NDP4 notes that in line with Vision 2030 and the Industrial Policy the focus will be on the services and manufacturing sectors in areas where Namibia has a clear comparative advantage, namely:

- Logistics
- Tourism
- Manufacturing, and
- Agriculture.

Logistics and Manufacturing are relevant to the DMPT smelter expansion project. In terms of logistics the objective is to establish Namibia as a regional leader in logistics and distribution. In this regard the Port of Walvis Bay has been established as a key port for southern and central African logistics operations. In terms of manufacturing, the NDP4 notes that significant strides have been made in identifying and developing upstream and down-stream economic activities in the mineral sector.

The NDP4 also identifies a number of basic enablers that are essential conditions for economic development. While these conditions may not necessarily translate into rapid development, without them sustained development cannot take place. The most important basic enablers within the context of the NDP4 are:

- The institutional environment;
- Education and skills;
- Health;
- Extreme poverty, and
- Public infrastructure.

Institutional environment

Access to finance
The NDP4 notes that access to finance for enterprises remains a key challenge, particularly for start-ups and for micro and small-scale enterprises. The DMPT smelter expansion project will create potential opportunities for small-scale enterprises. However, the issue of access to finance will need to be considered in order to maximise the potential opportunities.

Access to skills
The NDP4 notes that there is limited access to quality skills and a mismatch in the supply of and demand for skills represents a severe constraint in terms of the development of the Namibian economy. The document also indicates that given the importance of skills in the different sectors of the economy, there is a need to focus more attention on the training and skills development. The DMPT smelter expansion project will create potential for the implementation of skills development and training programmes.

Research and development (R&D) and innovation
The NDP4 indicates that R&D and innovation levels in Namibia are low and the interaction between key actors, namely the State, research institutions and the private sector is limited. In addition, incentives for R&D and introducing new technology and promoting innovation are non-existent. The DMPT smelter expansion project has the potential to create opportunities to support R&D and innovation, including the introduction of new technologies, specifically with regard to the exploring solutions to reduce emissions and the management of the arsenic waste stream.

Public and private sector cooperation
The NDP4 notes that public and private sector cooperation is a key success factor when it comes to rapid economic growth. The DMPT smelter expansion project will create an opportunity for public and private sector cooperation.

Education and skills

The NDP4 notes that education is the single most important aspect of human development, and a critical success factor for economic advancement and increased equality. The NDP4 identifies a number of key concerns regarding education of which the following are relevant to the proposed project:

- Vocational training opportunities, and
- The mismatch between the supply of and demand for skilled labour.

While the number of vocational and technical education (VET) and community skills development centres gradually increased under the NDP3, the quality of the training remains a concern. The document also states that there are an insufficient number of private vocational or technical centres in the country. The DMPT smelter expansion project has the potential to create opportunities for vocational and technical education.

Access to quality Early Childhood Development is also identified as a key issue. This issue is also relevant in terms of the DPMT Community Trust and its focus on education.

Health
The NDP4 notes that a healthy population is one of the basic requirements for quality of life. Furthermore, a healthy population is one of the core foundations for economic growth and development, helping to increase worker productivity and investment as well as reap the benefits of investments in education. Worker and community health were identified as key social issues associated with the DMPT smelter expansion project. However, the introduction of new technology has the potential to address these issues.

Extreme poverty
Poverty and inequality remain key challenges facing many Namibians. While the DMPT smelter expansion project will not address the national challenges facing Namibia, the provision of employment and the benefits associated with the Community Trust will assist to address some of the challenges at a local and regional level.

Public infrastructure
The NDP4 notes that modern reliable infrastructure is critical for high and sustained economic growth. Namibia has a relatively good core network of national economic infrastructure including a transport network, electricity distribution lines, dams, and information communication infrastructure. However, the NDP4 notes that there are emerging challenges which, if not addressed during the next five years, could become serious obstacles to high and sustained economic growth. To address the challenges the NDP4 identifies the opportunity for Namibia to become an international logistics and distribution hub by 2030.

The key infrastructure relevant to the DPM smelter expansion project includes transport (rail, road and maritime), energy and water infrastructure. In terms of transport infrastructure the NDP4 notes that by 2017 Namibia will have a well-functioning, high quality transport infrastructure connected to major local and regional markets as well as linked to the Port of Walvis Bay. For energy, by 2017 Namibia will have in place adequate base load energy to support industry development through construction of energy infrastructure and the production capacity would have expanded from 400 to more than 750 MW. For water, by 2017 the aim is to provide increased access to safe drinking water for human consumption

from 85.5 to 100% of the population as well as sufficient water reserves for industrialisation.

4.3.3 National Industrial Policy

The vision of Namibia's Industrial Policy is anchored in Vision 2030, namely that Namibia should be characterised as "a prosperous and industrialised country, developed by her human resources, enjoying peace, harmony and political stability".

Of relevance to the DPMT smelter expansion project the policy notes that Namibia should have a competitive and sustainable 'green' economy, with high employment levels and social justice. In this regard wealth would be shared equitably and there should be a significant improvement in quality of life for all Namibians.

The policy is underpinned by a number of key principles, of which the following are relevant to the DPMT project:

- The Industrial Policy is anchored in Vision 2030. As such the policy takes due cognisance of Namibia's stated objective of becoming a developed and industrialised nation by 2030;
- Industrialisation will follow the principle of integrated development. In this regard, it will be built on the following three interrelated pillars, namely market integration, infrastructure development, and industrial development. Without any of the three no meaningful industrial development will be possible;
- Industrialisation will be based on equitable and broad-based economic empowerment, in order to ensure that all Namibians benefit from rapid economic development, including breaking the divide between rural and urban disparities; and
- Industrialisation must be sustainable, with an emphasis on sustainable manufacturing and development.

The role of the state is outlined in the policy and highlights the importance to promoting public–private partnerships (PPPs) and other forms of cooperation between the Government and the private sector. The policy also recognises that ineffective and inefficient governance can seriously hamper economic development. The approach of the Namibian Government will be to intervene only where necessary. Of relevance to the DPMT smelter expansion project the Government may intervene where there is a need to protect the broader public interest.

In terms of the role played by key stakeholders, partnerships are recognised as a major prerequisite for the achievement of dynamic, efficient and sustainable development. Of relevance to the DPMT smelter expansion project these partnerships involve cooperation between the Government, labour, communities and civil Society, the private sector, non-governmental organisations, community-based organisations, and the international community.

The policy notes that the private sector, through organised and informal business, has a key function in Namibia's economic development and industrialisation. In this regard Vision 2030 envisages that the business community will make increasing contributions to the education and training sector, being the major recipient of the products of that sector. In addition, the private sector is expected to contribute to development through corporate social responsibility initiatives.

The policy also recognises the importance contribution organised labour in terms of economic stability and the supply of skills and workers. However, the policy does comment on the rigidity of current labour legislation and the low productivity of the labour force as constraints to economic development.

Incentives for industrialisation
In terms of incentives for industrial development the policy commits the government to Implementing measures aimed at making it easier for businesses to set up and operate in Namibia. Of relevance to the DPMT smelter expansion project these include the establishment of support schemes, such as spatial industrial zones or economic development zones, as well as tax incentives.

Industrialisation and small business development
The policy highlights the key role played by small medium enterprises (SMEs), specifically in terms of job creation and economic development. The development and promotion of SMEs therefore forms a core component of Namibia's Industrial Policy framework. This includes the promotion of training and development programmes for SME entrepreneurs. The DPMT smelter expansion project has the potential to create opportunities for SMEs, specifically in terms of procurement. The Community Trust also supports the establishment and development of local SMEs.

Skills and industrialisation
Education and skills development form a key component of the policy. A key element involves the development of vocational skills through the establishment of vocational training centres and technical institutions, including the establishment of regional centres of excellence. The policy also notes that apprenticeships and internships form an important component of skills development and bridging the gap between classroom training and the requirements of the real work environment. In this regard the policy highlights the importance of promoting specialised training, including apprenticeships and internships as well as investigating possible incentive measures to ensure success. These objectives are supported by DPMs skills development and apprenticeship programmes.

Innovation, research and development, and industrialisation
The policy notes that the focus of Namibia's policy on innovation and R&D should be closely linked to the challenges facing the country. Of relevance to the DPM smelter expansion project the section identifies the importance of energy and resource efficiency. The section also lists a number of initiatives that are relevant to the project including R&D in the areas of resource efficiency, energy, transport, climate change, environmentally friendly production methods, land management, etc., and prioritise knowledge expenditure, including by way of tax incentives and other financial instruments to promote greater R&D investment.

Financing for industrialisation
The policy recognises that financing industrial development will be costly. However, these costs are necessary in order to support economic development. The policy notes that the approach to financing or development will consider not only the accounting costs of projects, but also the overall economic costs. Of relevance to the DPMT smelter expansion project this includes the opportunity costs of not implementing certain projects. It is also worth mentioning the overall economic costs should also include potential social and environmental costs. The aim of the EIA process is to attempt to identify these costs and weigh them up against the economic benefits of the project.

Policy coordination, implementation and evaluation
In terms of policy coordination, implementation and evaluation, the policy highlights the importance of undertaking independent evaluations both in-house and by independent bodies. These evaluations should be undertaken on a yearly basis and the results should be provided the National Planning Commission, the Ministry of Trade and Industry, as well as to the public and private sector agencies concerned. Of relevance to the DPMT smelter expansion, the evaluation should include an assessment of the projects' impact on the socio-economic well-being of the people affected by it.

4.3.4 Logistics Master Plan for Namibia[2]

The establishment of an international logistics hub in Namibia to serve SDAC countries is identified as one of the key outcomes of the National Development Plan (NDP4). In order to realize this, NDP4 makes reference to the preparation of a "National Logistics Master Plan". The Development Vision of the present International Logistics Hub Master Plan is to "transform Namibia as a whole nation into an international logistics hub for SADC region by 2025".

The Master Plan was finalised in March 2015 and notes that Namibia should make the most of its location relative to the landlocked countries in the SADC region, such as Botswana, Zambia and Zimbabwe, and streamline the logistics system by shortening the lead-time for cargo transit and reducing the handling cost in freight transport. While the transhipment volume at Walvis Bay Port is growing, the volume of cargo unloaded at Walvis Bay and transported to the southern African landlocked countries is limited. At present, the function of transportation to the landlocked countries is concentrated at Durban Port in South Africa.

The DPM smelter expansion project will benefit from the establishment of Namibia as an international logistics hub. The expanded smelter also has the potential to support and act as a catalyst for the development of certain components associated with development of Namibia as international logistics hub for SADC region.

The establishment of the international logistic hub is based on five key elements all of which would benefit DPM and the expansion of the smelter. The five elements are:

- Efficient port at Walvis Bay;
- Storage (operation base for logistics industry);
- Efficient transport network;
- Collection and distribution of goods (international logistics companies), and
- Cross-border arrangements.

The Master Plan also identifies seven strategies aimed at achieving the vision and transforming Namibia into an "International Logistics Hub". The following strategies are relevant to the DPM smelter expansion project

[2] Master plan for development of an international logistics hub For SADC countries in the Republic of Namibia, Final Report, March 2015, Japan International Cooperation Agency (JICA)

- Strategy 3: "Anchor tenants approach" is the best and fastest way to get the volume. The expansion of the smelter has the potential to establish DPM as a key client and beneficiary of the logistics hub;
- Strategy 4: Remove critical bottlenecks on the key corridors by expanding throughput capacity to enhance "speed and reliability." The implementation of Strategy 4 will benefit DPM;
- Strategy 5: Get up to international standard as quickly as possible. The implementation of Strategy 5 will benefit DPM;

The Master Plan also notes that the road and rail transport system does not meet international standards. In order to address this issue the Master Plan identifies the need to upgrade key sections of trunk roads. Of relevance to the DPM smelter expansion project the report recommends that the following roads need to be up-graded:

- Trunk road between Swakopmund–Karibib;
- Trunk road between Karibib– Otjiwarongo.

The report also notes that maintenance must be undertaken for all trunk roads along the corridors.

In terms of the rail network the report notes that the current rail system is unreliable, is equipped with ageing locomotives, lacks adequate loading equipment and facilities and is not capable of meeting the increasing potential demand on bulk cargo in Namibia. Of relevance to the DPMT smelter expansion project the report recommends the following:

- Comprehensive rehabilitation/ upgrade of 3 major lines to improve reliability and speed; Development of new cargo trains to meet increase in bulk/ container cargo demand;
- Investment in locomotives and loading facilities;
- Upgrading for the line section of Walvis Bay–Kranzberg;
- Upgrading for the section of Kranzberg–Windhoek;
- Purchase, repair and maintenance of rolling stock; and
- Preparation and development of "Grootfontein–Katima Mulilo" rail link.

The report also identifies a number of cross-cutting issues that also have a bearing on the DPMT smelter expansion project. These include:

- Shortage of human resources and skilled labour;
- Shortage of power generation capacity within Namibia; and
- Stable water supply.

The Master Plan also notes that the components associated with the establishment of Namibia as an international logistic hub also have the potential to generate negative social and environmental impacts. However, these impacts can be effectively managed. The impacts that have a bearing on the DPM smelter expansion project include:

- Higher risks of traffic accidents, noise, and other negative impacts.
- Higher risks of spreading communicable diseases.

However, at the same time the upgraded road and rail system will promote socio-economic development and benefit tourism.

4.3.5 Planning Update since the SIA study was undertaken

Since this SIA fieldwork began there has been a significant addition to development projects being planned, and recently initiated in Tsumeb. According to the online Namibian newspaper, Northstar, a new largescale development, called SmartCity, had its ground-breaking ceremony in December 2018 (however no ESIA could be found relating to this project). The development is situated in the South-Eastern part of Tsumeb and is to be developed by MKP South Africa, at an estimated cost of ~US$ 1 billion, plans include the construction of a medical university providing an international standard education to 25 000 students, including accommodation for all staff and students. In addition, SmartCity is planned to have six hotels, office space and entertainment and recreational facilities. An international airport is also planned as part of the development. The project is anticipated to provide 10 000 job opportunities. It is currently expected that residents of Tsumeb would be given a 10% equity share in the MKP South Africa and Tsumeb Medical University development. This would amount to an estimated N$2 billion from an estimated N$20 billion total investment in the project (www.northstar.com.na). This is an extremely ambitious project that, if it succeeds, would have the potential to significantly change the economic landscape of Tsumeb (see Figure 5).

The information to account for potential cumulative impact of SmartCity project is not available at this stage but will be assessed by DMPT once available.

Figure 5: Envisaged Tsumeb SmartCity development (Source: MKP South Africa website 2018 https://www.mkpsouthafrica.com/portfolio-item/ground-breaking-in-namibia-6th-december-2018/)

5 SOCIO-ECONOMIC CONTEXT

5.1 INTRODUCTION

The significance of impacts is often highly dependent on the socio-economic environment or context within which these occur. For example, job creation in a small local community with a stagnating economy will be far more significant than it would be in a larger community with a healthy economy. In order to offer such baseline information to the impact assessment this section provides an overview of the socio-economic environment of the local area and region where the majority of impacts are likely to be felt, namely Tsumeb and the Oshikoto Region. In so doing it provides an overview of:

- The town of Tsumeb and its history;
- Overview of social receptors in the vicinity of the smelter; and
- A demographic overview of the study area[3].

The following two images provide a useful visual perspective of the location of the smelter precinct (to the North/North-East) (see Figure 6) separated from the town and residential areas by a hill (see Figure 7)

Figure 6: DPMT Smelter and old mine infrastructure seen from the South
(Source: Google Earth)

[3] The overview of the demographic and socio-economic environment is based in the information from the Economic Impact Assessment undertaken by Independent Economic Researchers (December 2016). Data for this Assessment was based on the 2011 census, which is still the most recent comprehensive socio-economic data available in Namibia.

Figure 7: Tsumeb Town with the edge of the smelter boundary seen to the North-West of the closest residential area (Source: Google Earth)

5.2 HISTORY OF TSUMEB AND THE MINE

The town of Tsumeb is the largest town in the Oshikoto region in northern Namibia and is the gateway to the north of Namibia. The town is also the closest town to the internationally renowned Etosha National Park. The town used to be the administrative capital of the Oshikoto Region. However Omuthiya became the capital in 2008.

The name "Tsumeb" is believed to derive from a local Herero word, "Otjisume", describing the occurrence of a small green hill, some 180 metres long by 40 metres wide and 12 metres high, referred to as the "*place of moss*" or "*the green frog*" (Vedder, 1938). The original hill was reported by the first European in the area, Sir Francis Galton, in 1851. In 1885, Will W. Jordan, a trader and elephant hunter first bought the land and mineral rights covering Tsumeb from the local Owambo Chief which soon thereafter were cancelled and given to Robert Lewis, also a trader and elephant hunter, for a period of 20 years. Unfortunately for him, the country had been declared a Protectorate of the German Empire the year before and so his claim was not recognised and the area was then granted to the newly formed South West Africa Company. In 1892, the South West Africa Company sent a geological expedition under Mathew Rogers to examine the copper outcrop. In 1900 the mining rights were acquired by the Otavi Minen- und Eisenbahn-Gesellschaft (OMEG) and mining commenced in 1906. The mine is internationally renowned for its wide range or rare minerals. The first smelter was established on the hill immediately to the north of the old mine (Plates 1 and 2). Production was interrupted by both World Wars and, after World War II the mine was sold to the Tsumeb Corporation Ltd (TCL), in which Newmont Mining was the majority partner (Ramsey 1973). The current smelter was established in 1962 with a capacity to process 81 000 t/a lead and 32 000 t/a copper. The smelter was expanded in 1976 and in 2008 the Ausmelt

furnace was re-commissioned as part of the copper smelting process. Goldfields of Namibia acquired the mine in 1988 but by 1996, a prolonged labour strike led to the flooding of the lower levels and the mine was closed in 1998 and put into liquidation.

The mine, together with all the Namibian mining assets held by Goldfields Namibia, was repossessed by the Namibian Government and sold to a locally registered company, Ongopolo Mining and Processing Limited (OMPL) in 2000, which continued to recover ore remaining in the upper levels of the mine and to operate the smelter. In 2006 OMPL was acquired by Weatherly Mining International and mining operations were stopped. The smelter was sold to Dundee Precious Metals Inc. in 2010 (http://www.tsumeb.com). Dundee purchased the smelter only and not the old mining area which is still owned by Weatherly.

Plate 1: Old Tsumeb smelter

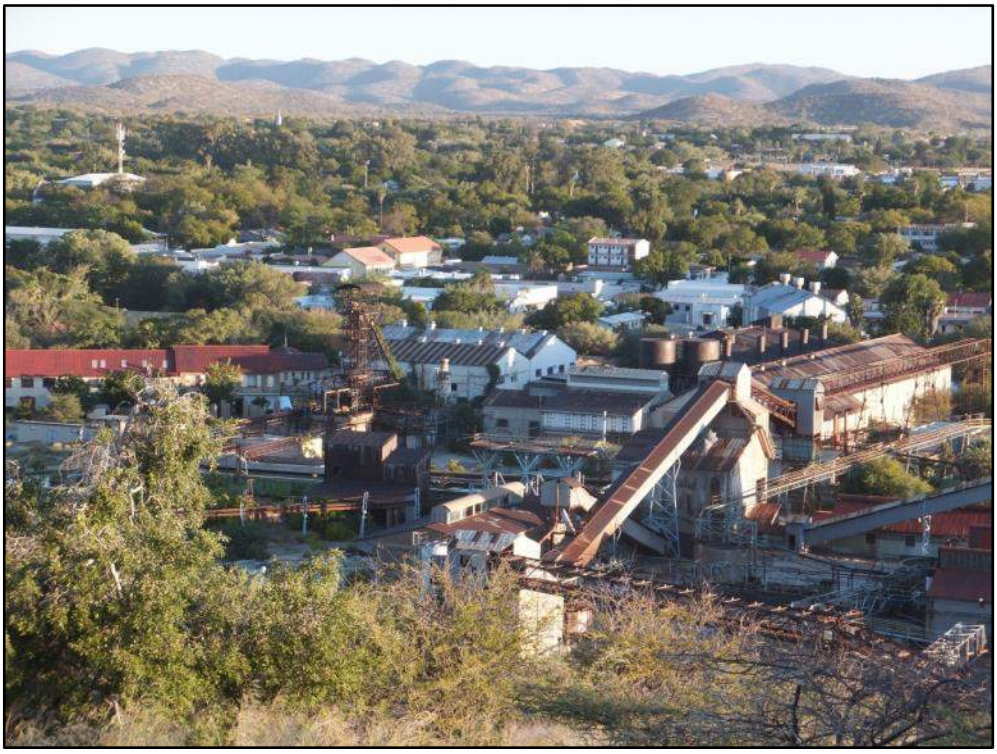


Plate 2: Old Tsumeb mine area with town in the background

5.3 SOCIAL RECEPTORS IN THE VICINITY OF THE SMELTER

The DPMT smelter is located in a valley that is bounded by low hills to the east, south and north, ~ 2 km to the north-east of the central business district (CBD) and the old Tsumeb mine (Plates 3 and 4). The smelter and associated processing dumps are screened from the town by a low hill. The hazardous waste disposal site is located on the northern side slopes of the low hill and is located ~ 0.5 km from the nearest residential areas in the town (Plate 5).

Plate 3: DPMT smelter

Plate 4: Tsumeb CBD area and De Wet shaft headgear

Plate 5: Hazardous waste disposal site

The closest residential areas to the smelter are Ondundu and the northern parts of Tsumeb, which are located ~ 1.3 km and 1.5 south-east and south of the smelter respectively, on the southern slopes of the low hill that separates the smelter from the town (Plate 6). There are two schools in the Ondundu residential area. The Tsumeb Gymnasium Private School and the Tsumeb Private Hospital and associated residential areas are located ~ 1.6 km to the south of the smelter (Plates 7 and 8). Other land uses located within relatively close proximity of the smelter include the golf course and western industrial area, which are located 2 and 2.2 km west and south of the smelter respectively (Plate 9).

Plate 6: Ondundu Primary School

Plate 7: Tsumeb Gymnasium School

Plate 8: Tsumeb Private Hospital

Plate 9: Western Industrial Area

The Health Impact Assessment (HIA)(Professor Myers, December 2016) notes that the western and the northern town industrial area (where the old mine is located)

are nominally the most highly exposed areas in Tsumeb. The AQIA notes that these areas form part of the high exposure zone which overlaps with the smelter precinct itself. The residential area of Ondundu, the Tsumeb Gymnasium Private School, Tsumeb Private Hospital Tsumeb and residential areas in the Tsumeb North area all fall within the medium exposure zone. The residential areas to the South of this zone comprising Nomtsoub to the west and the Eastern suburbs of Tsumeb fall into the low exposure zone. The HIA refers to these areas as Town Central.

The areas to the north and east of the site consist of farm land. Merastroom Farm is the nearest farm and is located ~ 2 km north-west of the smelter (Plate 10). NAMFO farms, which is the largest vegetable and fruit producer in the area is adjacent to the B1 Main Road, ~ 5.5 km north-west of the smelter (Plate 11). The Tsumeb waste water treatment plant is located just north of the turn off to the smelter, ~ 2 km west of the smelter (Plate 12).

Vulnerable Groups

Based on their location in the so-called medium exposure zone immediately to the south of the smelter precinct, the fence-line communities of Ondundu and Endombo are considered to be a impacted communities in relation to further expansion of the smelter. According to the findings of the Community Health Assessment, a sample of residents of Ondundu show elevated inorganic urine arsenic levels. DPMT reported that the preliminary results from the 2018 health impact studies indicated the main source of exposure to be from the legacy waste sites. The possible exposure pathways of arsenic were investigated in the Community Health Assessment with input from an ongoing contaminated land assessment study. Based on the preliminary findings, all signs indicate that the exposures in Ondundu are related to the presence of historic mine dump sites surrounding the settlement and not current smelter activities. Without historic mining impacts being addressed outside of the smelter boundary, there is a potential for even minor contributions from current and future smelter emissions to contribute cumulatively to impacts being experienced by this fence-line community. In order to assist with addressing historic impacts outside of the site boundary, DPMT is continuing with follow-up community health surveys (every two years) in order to better understand exposure pathways and contribute to finding long-term solutions for addressing legacy mine issues.

Plate 10: Merastroom Farm with smelter stacks in the background

Plate 11: Entrance to NAMFO

Plate 12: Entrance to Tsumeb sewage works (left) and Western Industrial area to the right

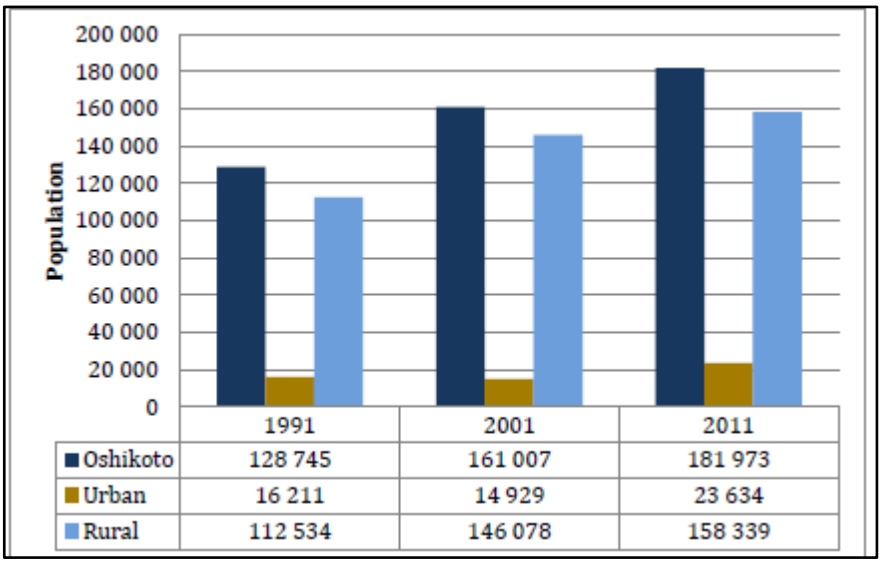
5.4 Demographic Overview

The Oshikoto Region is one of Namibia's thirteen regions. The capital of the region is Omuthiya. The region borders onto Ohangwena in the north, Kavango in the east, Otjozondjupa in the south east, Kunene in the south west, and Oshana in the west and consists of 10 constituencies, namely: Eengondi, Guinas, Okankolo, Olukonda, Omuntele, Omuthiyagwiipundi, Onayena, Oniipa, Onyaanya, and Tsumeb. The main economic activities are farming and mining. Tourism also plays a key role.

Population

The population of the Oshikoto Region increased from 161 007 in 2001 to 181 973 in 2011, an annual growth rate of 1.2% (Figure 8). Of this total females made up more than half of the population (52.2%). The proportion of the female population in rural areas (52.4%) was greater than in urban areas (50.7%). The majority of the population (87%) live in the rural areas.

Tsumeb had a population of 19 840 in 2011 up from 14 907 in 2001, implying that the town had grown by 33% in this ten-year period. This was more than twice both the national (15%) and regional (13%) growth rates over the same period (NSA, 2012a; NSA 2012b). Growth since 2011 has also been robust according to municipal officials and other sources. Though not based on official statistics, the Tsumeb community needs assessment conducted for DPMT in 2015 found it likely that Tsumeb's population has grown by at least 25% since 2011 to over 25 000 inhabitants driven primarily by the growth of informal settlements (Yarmoshuk, 2015). The informal settlement of Kuvukiland was established in 2009, after which it quickly grew to 9 600 residents by 2014 and has continued to grow steadily since.



	1991	2001	2011
Oshikoto	128 745	161 007	181 973
Urban	16 211	14 929	23 634
Rural	112 534	146 078	158 339

Figure 8: Population size by Census year and area

Migration to Tsumeb

Given the extremely variable and high population growth estimates presented during this SIA as well as alternative online estimates (Tsumeb population numbers anywhere between 12 000 and 40 000, including Kuvukiland), undertanding levels of migration into the town is complex and multi-factored. While DPMT's acquisition of the smelter might have attracted some job-seekers to the town, interviews with Tsumeb municipal representatives highlight the establishment of the informal settlement of Kuvukiland in 2009 and other mining operations in the area as additional triggers of the influx of people.

The migration of people from rural to urban areas is also a general trend being experienced across the country. In this regard, a 2015 Country Profile report by the International Organisation for Migration (IOM) indicated that the urban population of Namibia grew by a staggering 49.7% between 2001 and 2011, with this trend continuing. Urbanisation is noted as an important phenomenon in Namibia with major implications in terms of access to land and health and development challenges. The age demographic of migrants in Namibia supports the view that employment and occupation are key drivers of internal migration. In Namibia little is known however, of whether influx to urban areas is helping to boost economic growth or contributing to poverty (IOM, 2016).

Age and Gender Structure

In terms of age structure, the Oshikoto region had a relatively young population, with ~ 40 % of the region's population being less than 15 years of age. Median age was 19 years, and was therefore young. The share of young people below the age of 15 years in rural areas was 41 % while that of urban areas was 33 %. The proportion of elderly people aged 60 years and above in rural areas was 8.9 %, while in urban areas the elderly made up 5.6 % of the population.

With regards to age composition, 62% of Tsumeb's population was between the ages of 15 and 59 in 2011. This is higher than the figure for Oshikoto (52%) and Namibia (57%).

Tsumeb also has a relatively young structure. As indicated in Figure 9, there were a larger number of people in the 0 – 4 age group than any of the others, a trait which is typical of a population with simultaneously high levels of fertility and mortality. According the Needs Assessment (2015) over 40% of Tsumeb's inhabitants are under 20 years of age.

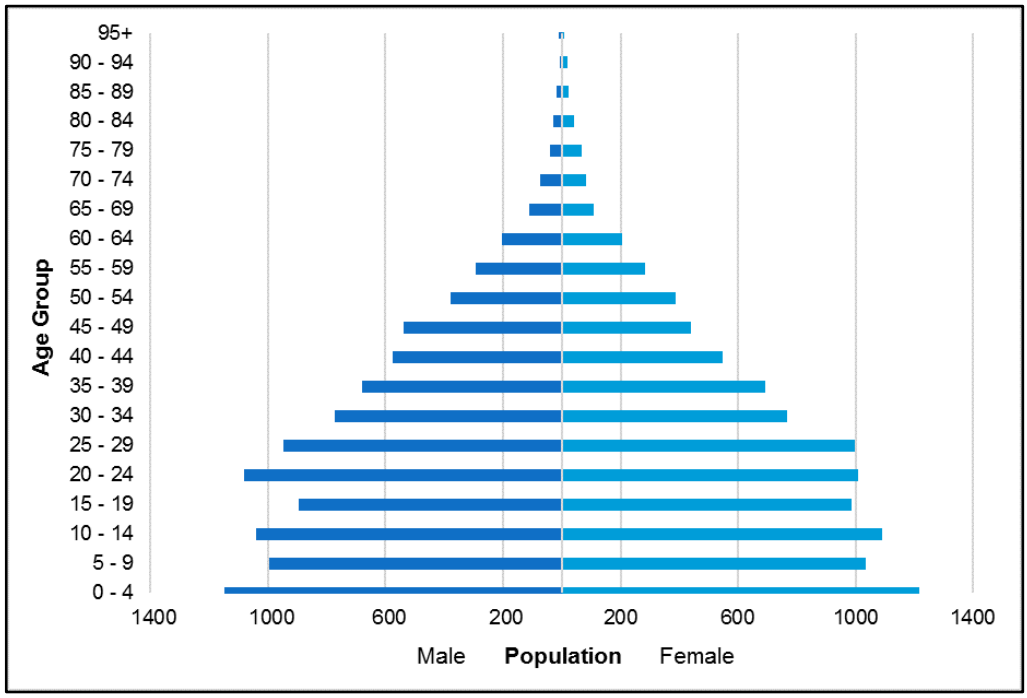


Figure 9: Population Pyramid, Tsumeb
Source: NSA, 2012a

In terms of population density, Namibia had an average population density of 2.6 people per km^2 in 2011 (NSA, 2012e). The density varies significantly across the country as well as within the region of Oshikoto. Tsumeb is the most densely populated part of Oshikoto. The average household size in Tsumeb is 3.9, which is close to the national average of 4. For Oshikoto the figure is higher, at 4.8.

Gender

According to the 2011 census data Namibia had a total population of 2,104,900 with 51% of the population being females and 49% being males. Oshikoto had a total population of 181,973 with 52% being female and 48% being males. Females were the predominant gender on the national and regional level. Tsumeb was equally divided along gender lines. Of the total 2011 Census population of 19,700, 50% was female and 50% male.

According to the UN Women Global Database on Violence Against Women, 25% of women in Namibia between the ages of 15 and 49 reported having experienced intimate partner violence at least once (The Democracy Report on Gender-based Violence, 2018). Gender based violence (GBV) is recognised as a significant issue in Namibia resulting from gender inequalities and stereotypes. 32% of Namibian women aged between 15-49 have reportedly experienced physical violence within their marriages. Only 1 in 3 of women abused in this age category have reported this

violence. In addition, the Report hilights that 6 percent of pregnant women reported experiencing violence during their pregnancy. The gender inequalities and levels of acceptance around GBV are hilighted in the report which shows that 28% of women and 22% of men believe that a husband is justified in beating his wife under certain circumnstances (The Democracy Report on Gender-based Violence, 2018).

Indigenous People

The indigenous peoples of Namibia include San, Nama, Ovahimba, Ovazemba, Ovatjimba, Ovatwa and their subgroups. The Constitution of Namibia prohibits discrimination on grounds of ethnic or tribal affiliation, but it does not specifically recognize the rights of indigenous peoples or minorities, and there is no national legislation that deals directly with indigenous peoples.

According the IWGIA website, Namibia voted in favour of the United Nations Declaration on the Rights of Indigenous Peoples in 2007, but has not ratified ILO Convention 169, an international legal instrument that specifically addresses the rights of indigenous peoples (IWGIA.org, accessed March 2019).

A small percentage of Tsumeb's residents are identified as San.

Literacy

The literacy rate in the region was ~ 88 %. The rate in the urban and rural areas was 89.6 % and 87.9 % respectively. There are therefore no significant differences between the rates for urban and rural areas.

Educational Attainment

In terms of education, 38.7 % of the population had completed their primary education, while 15.1 % had completed their secondary education before leaving school. Only 3 % had a tertiary education.

Employment

59.7% of the economically active population aged 15 years and above were employed while 40.3 % were unemployed. There were no significant differences in the employment between urban and rural areas. The unemployment rate in Tsumeb was 36%. The labour force participation rate for Oshikoto region was 56.7 %. In terms of gender, the rate was higher for males (57.8%) than for females (55.6%). The labour force participation rate in rural areas (54.0%) was also lower than in urban areas (72.6%)[4]. Figure 10 provides a breakdown for the Osjikoto Region.

[4] Note that the methods used to measure unemployment have since 2011 been updated. Official unemployment rates are therefore much lower in recent years, but the actual phenomenon of joblessness which the rates seek to measure has remained relatively similar in magnitude.

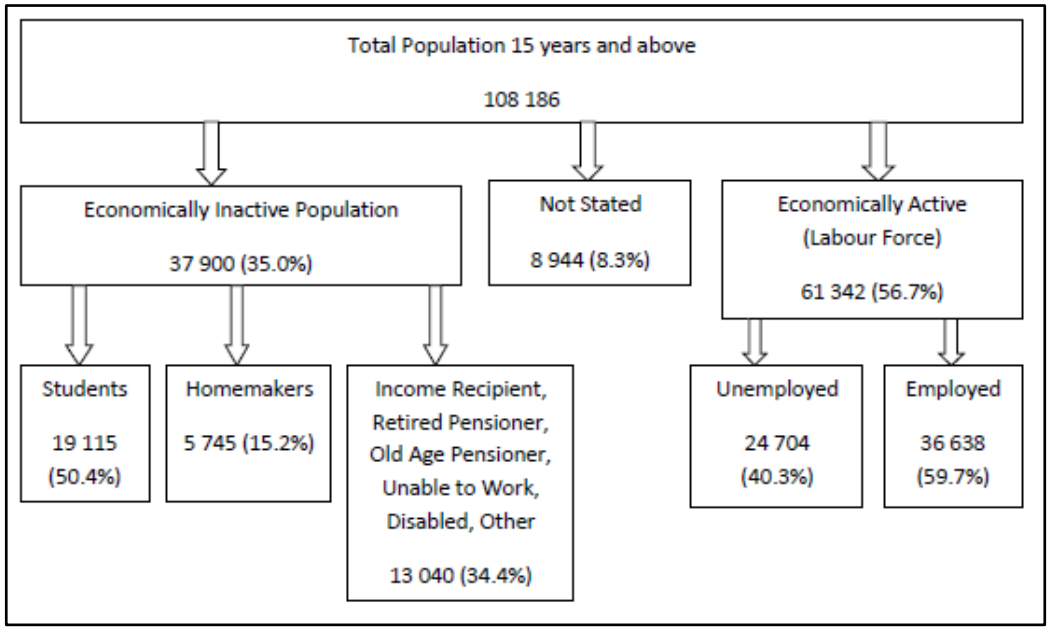


Figure 10: Schematic showing activity status breakdown for Oshikoto, 2011
Source: NSA, 2012a

Tsumeb also has a relatively high proportion of economically active people – 74% and 81% respectively as compared to 64% for Namibia.

The key sectors in terms of employment in the Oshikoto region are agriculture (49%), followed by administrative and support service activities (7% of jobs), education and activities of private households (6% of jobs each). The manufacturing sector only contributes 3% to total direct employment in Oshikoto. This serves to emphasise the importance of plants such as DPMT, which employs 730 people (Table 1), in providing diversification.

Table 1: DPMT employment figures (31 December 2018)

Type of Employment	***Males***	***Females***
Number of Permanent Employees by Region and Gender (Tsumeb)	601	98
Number of Temporary Employees by Region and Gender (Tsumeb)	55	4
Full time employees	656	102
Part-time Employees	0	0
Contractors	657	73

Source of income

The 2011 Census survey found that farming (33.3 %) was the main source of income in the Oshikoto region, while the lowest source of income was reported to be disability grants (0.6%). In rural areas, 38.8 % of households reported farming as the highest main source of income, while wages and salaries (64.0%) dominated in urban areas.

In terms of agricultural activities, crop farming (62.9%) was the most common agricultural activity in the Oshikoto region while agro processing (0.5%) was the

least common agricultural activity. In rural areas, ~ half (50.1%) of the households were involved in crop farming. Livestock farming was also an important activity.

Income and poverty levels

Given the significance of agriculture in terms of job provision, it is not surprising that farming accounts for a large source of primary incomes both nationally (16%) and in Oshikoto (33%). In urban areas such as Tsumeb, however, 69% of households reported that wages and salaries provide the main source of income.

The National Planning Commission (NPC) has combined 2003/04 and 2009/10 Namibia Household Income and Expenditure Survey data with 2001 and 2011 Census data to develop 'Poverty Maps' of the country. Figure 11 shows the Poverty Map for Oshikoto which reveals that around 18.5% of Tsumeb's population could be classified as poor in 2011. This is significantly lower than the average for Oshikoto – 42.6% (NPC, 2014).

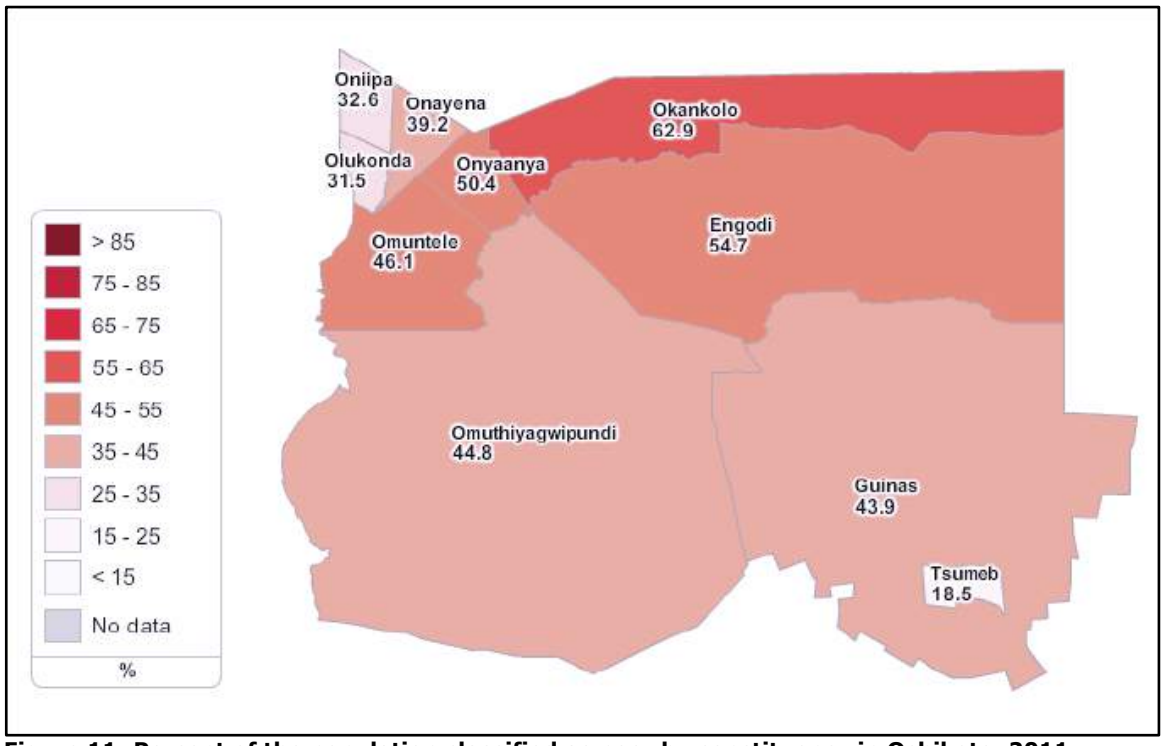


Figure 11: Percent of the population classified as poor by constituency in Oshikoto, 2011
Source: NPC, 2014

Water supply and sanitation

69.7 % of the households in the Oshikoto region had access to safe water. In the urban areas ~ 98 % of households had access to safe water compared to ~ 65 % in rural areas. In terms of sanitation, 68.9 % of the households had no toilet facilities, while only 17.2 % had access to flush toilets. In urban areas, ~ 65 % of the households used flush toilets while the corresponding rural percentage was only about 8 %. The lack of toilet facilities was observed in all the constituencies, with over 50 percent of households lacking toilet facilities. Only Olukonda (45.8%) and Tsumeb (27.1%) had less than 50 % rates under the indicator 'no toilet facility'.

Households in Tsumeb have relatively high service levels compared to the rest of Oshikoto and to Namibia as a whole. In both 2001 and 2011, Tsumeb's households

had higher access levels to safe water and electricity for lighting, and also fewer households used wood/charcoal for cooking. Furthermore, more households had access to a toilet facility.

Waste disposal

The most common means of disposing waste in the Oshikoto region was through burning (66.7%). In urban areas, just over 53 % of households benefited from regular waste collection, while 76 % of households in rural areas burned their waste. Similarly, at constituency level, regular waste collection was most common in Tsumeb (57.9%). The rest of the constituencies depended largely on burning as a means of disposing of their waste /garbage.

Health facilities

There is one private and one state hospital in Tsumeb with a further three health care centres and 22 primary health care clinics in the Oshikoto region. In Namibia there is a high impact of HIV/AIDS on the labour force. HIV prevalence is estimated through measuring HIV-prevalence among pregnant women attending ante-natal clinics. The results of the 2016 National HIV Sentinel Survey indicated that the HIV prevalence rate in Namibia was 17.2 % with Tsumeb's prevalence rate at 14.5 %.

A Community Based Organisation, Tov, provides physical, emotional and educational support to school age children who are orphaned or vulnerable as a direct result of HIV/AIDS. The Tov Centre is based in Nomtsoub. This organisation was established in response to the growing number of children becoming orphaned or vulnerable due to losing family to HIV/AIDS. A request for more detailed information on health indicators and illness statistics for the Tsumeb area was made to the Ministry of Health in 2018, but no information was received. Further details on the available health information for Tsumeb are provided in the Community Health Assessment undertaken as part of the EIA.

6 IDENTIFICATION AND ASSESSMENT OF KEY ISSUES

6.1 Introduction

Section 6 provides an assessment of the key social issues identified during the study. The identification of key issues was based on:

- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties; and
- Experience with similar projects.

The assessment section is divided into the following sections:

- Assessment of compatibility with relevant policy and planning context ("planning fit";
- Assessment of social issues associated with the construction phase;
- Assessment of social issues associated with the operational phase;
- Assessment of social issues associated with the decommissioning phase.
- Assessment of the "no development" alternative;
- Assessment of cumulative impacts.

6.2 Scoped-Out Impacts

Before describing the key issues and impacts related to the Expansion Project, it is worth summarising the SIA team's considerations in *excluding* a number of issues that may commonly be expected as assessed impacts in projects of this nature:

- Land-use and resettlement – given that the Expansion Project's footprint will not increase, there is no anticipated loss of access to land for physical or economic use. Thus the conditions which would usually trigger the need for resettlement planning and compensation are not relevant to the current Project.
- Health impacts – Detailed health impacts are discussed along with mitigation measures in the HIA. Improved technology and management of emissions from the smelter suggest that no resettlement would be necessitated for health reasons related to the Expansion Project. In addition, the preliminary results of the ongoing contaminated land assessment and soil sampling is showing that elevated urine arsenic levels are mostly likely linked to historic sources outside of the smelter boundary. DPMT is working with the local municipality in order to further investigate this and to assist in addressing historic contamination issues. No new arsenic-related health impacts are expected from the smelter expansion.
- Influx management – As described above, there is significant population growth in Tsumeb. Suburbs are experiencing densification in areas. This influx is briefly discussed above and seems to be a combination of general migration patterns within the country from rural to more urban areas, along with movement of people in search of employment opportunities. Against the scale of this migration to the area Project-related migration is not anticipated to contribute significantly to an influx to Tsumeb. Through the Tsumeb Community Trust, DPMT will continue to contribute to improving municipal services which in turn will help to manage migration and increased pressure on local service delivery in the area.
- Indigenous peoples - The brownfields nature of the Expansion Project means that there will be no new negative impacts on indigenous people in the area. This

special interest group, together with other disaggregated community groups will need to be engaged through the Stakeholder Engagement Plan (SEP) included in mitigation measures below. This will contribute to maximising the spread of Project-related benefits accruing to communities along the fence-line.

- Cumulative impacts – It is not anticipated that there will be any significant negative cumulative social impacts triggered by the Expansion Project. This assessment is based on the migration issue discussed above as well as the limited number of long-term job opportunities; the historic presence of mines in the area which have already resulted in a more urbanised and less traditional social and cultural environment and are unlikely to face additional or new changes from this proposed Project.
- Cumulative impacts related to the proposed SmartCity development – There is no detailed project information for this development and no ESIA is publically available. It is therefore not possible to consider potential cumulative impacts.

6.3 POLICY AND PLANNING FIT

As indicated above, strategic long-term socio-economic development planning in Namibia is informed by Vision 2030, adopted in 2004, and National Development Plans (NDPs), of which NDP3 (period 2007-2012), NDP4 (2012-2017) and NDP5 (2018-2022) are the most recent. Vision 2030 states that the vision of Namibia is for a "prosperous and industrialised Namibia, developed by her human resources, enjoying peace, harmony and political stability".

NDP3 identifies the mining sub-sector as one of the major contributors to the Namibian economy in terms of economic output and exports. In addition, the document notes that mining has stimulated significant infrastructural development and has been responsible for supporting a variety of community initiatives, conservation projects, training and skills development programmes, and various other social concerns in Namibia.

The NDP4 highlights the importance to shifting from an economy dominated by agricultural output and employment to one dominated by manufacturing and local value addition. Industrialisation is therefore a key component of Namibia's economic development strategy. This is supported by Namibia's Industrial Policy, which states that Namibia should be characterised as "a prosperous and industrialised country, developed by her human resources, enjoying peace, harmony and political stability".

The establishment of an international logistics hub in Namibia to serve SDAC countries is identified as one of the key outcomes of the National Development Plan (NDP4). In order to realize this, NDP4 makes reference to the preparation of a "National Logistics Master Plan". The Development Vision of the present International Logistics Hub Master Plan is to "transform Namibia as a whole nation into an international logistics hub for SADC region by 2025".

Based on the findings of the review the proposed expansion of the DPMT smelter is supported by Vision 2030, the NDP4 and the Industrial Policy, which also promote the development of Namibia as an industrialised nation. The expansion programme also supports two key objectives of NDP4, namely the achievement of faster and sustainable economic growth and the creation of employment opportunities. Therefore, provided that the proposed smelter expansion does not result in unacceptable environmental and socio-economic impacts, specifically health impacts,

it is reasonable to assume that the proposed DPMT smelter expansion is supported by and supports the relevant key policy and planning requirements for Namibia.

6.4 SOCIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION PHASE

The key social issues associated with the construction phase are the following:

Potential positive impacts

- Creation of temporary employment and business opportunities, and opportunity for skills development and on-site training.

Potential negative impacts

- Impacts associated with the presence of construction workers on local communities.

6.4.1 Creation of employment, training and business opportunities

Based on information from the Economic Impact Assessment (Independent Economic Researchers, 2016), the construction phase is expected to extend over a period of ~ 18-24 months and create ~ 185 person years of temporary employment opportunities. The work associated with the construction phase will be undertaken by contractors. The economic assessment notes that this estimate does not specify the average number of people who will be employed at any given time during construction, a figure which will probably vary considerably, with more workers at some times and less at others.

In terms of skills levels, the majority of the construction phase jobs will be available to medium skilled (99) and high skilled (57) personnel, with the remainder (29) being available to lower skilled personnel. The high number of skilled personnel is due to the technical nature of the project. It is therefore reasonable to assume that the potential employment opportunities for local community members from Tsumeb and the Oshikoto Region will be limited. The economic assessment indicates that ~ 90 person years of the employment opportunities would be taken up by people from the local area and 47 from the rest the broader Oshikoto region. It may however be difficult to achieve this figure due to the relatively low skills levels in the area. These figures appear to be ambitious. The majority of the employment opportunities are likely to be for low and, to a lesser extent, medium skilled, workers. This is supported by the findings of the Community Needs Assessment (2015), which noted the shortage of skills in the area.

DPMT does not currently distinguish between local and national employment rates; however, they are committed to do so going forward.

Already several local residents have complained about a perceived high number of non-Tsumeb residents being employed at the Smelter. This perception is not uncommon in the many areas worldwide where poverty levels and unemployment are high and skills levels are low.

The total wage bill for the construction phase is estimated to be in the region of N$ 53 million. Of this total N$ 2.8 million would be earned by low skilled workers, N$ 24.8 million by medium skilled workers and N$ 25.5 by high skilled workers. A

percentage of the wage bill will be spent in the local economy which will benefit local businesses. This benefit will be confined to the construction phase.

The proposed development will also create an opportunity to provide on-site training and increase skills levels. Given the medium timeframe of the construction phase (18-24 months) the proponent should investigate potential opportunities for implementing a skills and development programme aimed at local community members employed on the project.

In addition to the employment benefits the expenditure of N$ 722 million during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project the opportunities for the local Tsumeb economy are likely to be limited. The majority of benefits are likely to accrue to engineering and construction companies based in Windhoek and possibly South Africa. In addition, local transportation companies involved in the transport of the components associated with the expansion programme may also benefit from the project.

The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be largely linked to accommodation, catering, cleaning, transport and security, etc. In terms of accommodation, the high and semi and low skilled construction workers from outside the area will be accommodated in Tsumeb for the duration of the construction phase. This will create potential opportunities for local hotels, guest houses and home owners. The local hospitality industry will also benefit from the accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives, etc.) and other personnel involved on the project. Experience from other construction projects indicates that the potential opportunities are not limited to onsite construction workers but also to consultants and product representatives associated with the project.

Table 3.1: Impact assessment of employment and business creation opportunities during construction phase

Creation of employment and business opportunities during the construction phase	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**		**Severity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**
Severity/Nature: Positive socio-economic benefits associated with the creation of employment and business opportunities during the construction phase Without enhancement benefits would be Low. With enhancement benefits it would be moderate **Duration:** Short term **Spatial scale:** Fairly Widespread, beyond the site boundary, including the town of Tsumeb and the local region **Consequence:** Medium **Probability:** High with enhancement **Significance:** Medium Positive with enhancement	L+	L	M	L	M	M+	**Objective:** To maximise employment and business opportunities, specifically for local Namibian companies **Actions:** Implement recommendations listed below	M+	L	M	M+	H	M+

Recommended enhancement measures
In order to enhance local employment and business opportunities associated with the construction phase the following measures must be implemented:

Employment
- Where possible, DPMT must make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi- and low-skilled job categories. All staff employed will however need to meet the education and skills requirements set by the smelter;
- Before the construction phase commences, DPMT must meet with representatives from the Tsumeb Municipality and establish whether a skills database exists for the area. If such a database exists it must be made available to the contractors appointed for the construction phase;
- Representatives from the local community and Tsumeb Municipality must be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that DPMT intends following for the construction phase of the project;
- Where feasible, training and skills development programmes for locals must be initiated prior to the initiation of the construction phase; and
- The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.

Business
- The proponent must appoint local Namibian companies to undertake work associated with the construction phase where ever possible;
- The proponent, in consultation with the Tsumeb Municipality, must develop a database of local companies, specifically Small Medium and Micro Enterprises (SMME's), that qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies, etc.) prior to the commencement of the tender process for construction contractors. These companies must be notified of the tender process and invited to bid for project-related work; and
- Where possible, the proponent, in consultation with the Tsumeb Municipality, must assist local SMME companies to complete and submit the required tender forms and associated information.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

Stakeholder Engagement
In order for DPMT to begin to address community perceptions of high employment numbers for non-Tsumeb residents a clear and transparent stakeholder engagement process is needed. The Company must collate employment information to address this concern. Ongoing communication is a key part of managing expectations, especially given the relatively small number of new job opportunities that the Expansion Project will create against the backdrop of probably high expectations. DPMT needs to methodically develop its Stakeholder Engagement Plan, including a matrix of different stakeholders and appropriate communication, to proactively address existing and potential concerns and perceptions.

6.4.2 Impact of construction workers on local communities

The presence of construction workers associated with large construction projects can impact on local communities, specifically for projects located in rural areas or small towns. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on the local community. In this regard the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of male construction workers, including:

- An increase in alcohol and drug use;
- An increase in crime levels;
- An increase in teenage and unwanted pregnancies;
- An increase in commercial sex work;
- An increase in gender based violence; and
- An increase in sexually transmitted diseases (STDs).

In addition to the social problems listed above that may be linked to new construction workers in the area, a further influx of opportunistic job seekers and workers may also lead to:

- An increase in the demand for basic local services – access to land, water, electricity, health care;
- Increased pressure for accommodation – rental, informal shacks, low income, middle to high income houses and impact on property prices;
- An increased pressure on schools, should construction workers bring their families along.

As indicated above, in terms of skills levels, the majority of the construction phase jobs will be available to medium skilled (99) and high skilled (57) personnel, with the remainder (29) being available to lower skilled personnel. The majority of the skilled and semi-skilled workers are likely to be sourced from outside of Tsumeb, while the majority of the low skilled opportunities will be taken up by local community members. The number of construction workers from outside the area is therefore likely to be in the region of 100-130, which would represent 70% of the total work force of 185.

Based on the findings of the SIA there has been a rapid increase in the population of Tsumeb in the last 5 or so years. In this regard the local municipal officials indicated that the population had increased from around 18 000 in 2013 to 30 000 in 2016. There has therefore been a significant influx of people into the town in recent years. The Tsumeb Municipality 5 Year Strategic Plan (2011-2016) notes that this has exacerbated unemployment levels and that new people have largely settled in the informal settlement of Kuvukiland. In addition, Tsumeb is the gateway to northern Namibia and Angola and large numbers of truck drivers and other road users pass through the town on a monthly basis. As Tsumeb already has a sizable population and has experienced rapid population growth over the last decade, it is likely to be fairly resilient to a moderate influx of people. Based on the number of temporary job opportunities that would be available during the construction period, the presence of additional workers (100-130) from outside the area over a period of 18-24 months is therefore unlikely to have a significant impact on the local community. The potential risk posed by construction workers from outside the area is therefore likely to be low.

While these impacts at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. Given the nature of construction projects it is not possible to totally avoid these potential impacts at an individual or family level but appropriate prevention and mitigation measures can be implemented to minimize risks associated with worker influx.

Table 3.2: Assessment of impact of the presence of construction workers in the area on local communities

Impact of workers on local communities during construction phase	Unmitigated assessment						Mitigation/management measures	Mitigated assessment					
	Severity	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**		**Severity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**
Severity/Nature: Negative impacts on local communities and family networks associated with behaviour of construction workers. With mitigation severity likely to be low **Duration:** Short term **Spatial scale:** Fairly Widespread, beyond the site boundary, including the town of Tsumeb and the local region **Consequence:** Low **Probability:** Possible without mitigation and unlikely with mitigation **Significance:** Low Negative with mitigation	L	S	M	L	M	M	**Objective:** To minimise impact of construction workers on local communities **Actions:** Implement recommendations listed below	L	S	M	L	L	L

Recommended mitigation measures

The potential risks associated with construction workers can be mitigated. The detailed mitigation measures must be outlined in the Environmental Management Plan (EMP) for the Construction Phase. Aspects that must be covered include:

- Where possible, DPMT must make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- DPMT must establish a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities and special interest groups (e.g. health and social welfare service providers, women's groups, any organisations dealing with GBV), local councillors, and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers;
- DPMT and the contractor(s) must, in consultation with representatives from the MF, develop a code of conduct applicable within both the workplace and the surrounding community for the construction phase. The code, which must be signed by all employees as part of their contract should identify which types of behaviour and activities are not acceptable. It should include a clear statement about zero-tolerance of gender-based violence and should be displayed on site and in the surrounding communities. Construction workers in breach of the code should be dismissed. All dismissals must comply with the Namibian labour legislation;
- DPMT and the contractor must implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The contractors must make the necessary arrangements for allowing workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks; and
- The contractor must ensure that all construction workers from outside the area are transported back to their home towns within 1 day of their contract ending. This will reduce the risk of construction workers remaining in the area once their contracts come to an end.
- A community/external grievance mechanism providing different ways in which users can submit their grievances, will be developed and implemented by DPMT prior to contractors mobilising, and information will be provided to the community on its use. DPMT community liaison staff will be trained to adequately administer the grievance mechanism and how to handle any allegations of gender-based violence.

6.5 SOCIAL IMPACTS ASSOCIATED WITH THE OPERATIONAL PHASE

Based on the findings of the SIA the most significant social impacts are associated with the operational phase of the project. In this regard the key social impacts of relevance to the operational phase are:

Potential positive impacts

- Creation of employment and business opportunities and support for local and national economic development. The operational phase will also create opportunities for skills development and training;
- Benefit for DPMT Community Trust and town of Tsumeb; and
- Catalyst for investment and development.

Potential negative impacts

The key social impacts identified by the SIA relate to community and worker health. A comprehensive HIA (Professor J Myers, 2016) and AQIA (Airshed, 2017) have been undertaken as part of the EIA. The key findings of these studies are referred to when discussing the issues and concerns raised. The focus of the assessment is on the potential impact on the broader community as opposed to worker health. This aspect is dealt with in detail in the HIA. Other negative impacts include:

- Impacts associated with storage and transport of concentrate.

6.5.1 Creation of employment and business opportunities and support for local and national economic development

The expansion of the smelter will increase the capacity of the plant by ~ 54%, from 240 000 t/a to 370 000 t/a. The plant currently provides 667 direct jobs, of which 457 are employees and 210 are contractors. This makes DPMT the largest single employer in Tsumeb by some margin. For example other key employers in Tsumeb include the Municipality (124) and Henning Crushers (180). It is also worth noting that of this total, 407 (61%) of the jobs are for low skilled workers, 169 (25%) are for semi-skilled workers, and the remaining 91 (14%) are for skilled workers. DPMT therefore addresses a key need in the local economy, namely the provision of employment for low skilled workers.

The annual salary bill associated with the DPMT smelter is in the region of N$168 million. The only increase will be an additional two contractors. The majority of the annual salary bill will continue to be spent in the local Tsumeb economy, which represents a significant continued benefit for local businesses.

The expansion of the smelter will not result in an increase in permanent staff employees. The increase in production will however result in an increase in operational expenditure by ~ N$290 million, from ~ N$1.290 million to ~ N$1.580 billion per annum (Economic Assessment, 2016). The Economic Assessment notes that the key operational phase impacts associated with the project will result from the increased expenditure on operations at the plant following the expansion. The nature of this expenditure will also play a key role in determining impacts, specifically in terms of benefits for local Namibian suppliers.

In terms of employment, the Economic Assessment notes that the bulk of additional employment resulting from the expansion would result from indirect job opportunities. This would be linked to increased expenditure by DPMT in the local area and region on items such as transport and handling services, engineering services and supplies etc. The increased production will also result in increased revenue for NamPower for electricity. However, due to the economies of scale associated with electricity provision, increased employment would be minimal despite the substantial increase in expenditure on electricity

A key beneficiary of the expansion will be the transport sector. Concentrate is imported to Namibia via the Port of Walvis Bay. From here it is transported either via road or by rail to Tsumeb for processing. The final product is then transported back to Walvis Bay for export. Table 3.3 summarises DPMT's transport requirements.

Table 3.3: DPM transport requirements

Direction and nature of load	Approximate volume per month	Current	
		Truck trips per month	Train wagons per month (wagon capacity 42 Mt)
Inbound			
Concentrate and other imports through Walvis Bay	20 000 - 24 000 Mt	404	238
Coal imports through Walvis Bay	800 t	0	20
Total		**404**	**258**
Outbound			
Blister exports through Walvis Bay	3 000 - 4 000 Mt	115	0
Sulphuric acid to Rossing Mine	18 000 Mt	0	400
Sulphuric acid to Tschudi Mine	2 500 Mt	60	0
Arsenic exports through Walvis Bay	300 - 400 t	0	8
Arsenic exports to South Africa	80 - 100 t	3	0
Total		**178**	**408**

(Source: Economic Assessment, 2016)

Information obtained from Mr Peet Bonzair of Blaauws Transport (Walvis Bay) indicates that four transport companies transport ore from Walvis Bay to Tsumeb (Coleman Transport, Bokkie Transport, LMH and Blaauws). Between them they average about 120 trips per week from Walvis Bay to Tsumeb. Blaauws accounts for ~ 60 trips (50%) per week, the rest account for remaining 50 and 60 trips per week. TransNamib (rail) is also used to transport concentrate, ~ 7 000- 10 000 tonnes per month.

The contract with Blaauws has been in place since June 2012, starting off with 3 000 tons per month, now in the region of 8 000. The contract with DPMT has enabled Blaauws to expand its operations and purchase additional trucks. The company had 25 trucks and added another 13 trucks to meet demand. Blaauws is a Namibian company, established in 1956. In addition to the direct benefit to the transport companies, there are also a number of indirect benefits to the local economy, including purchase of fuel and supplies and maintenance of vehicles, etc. These benefits in turn create employment opportunities. All of these benefits stem from the contracts with DPMT to transport concentrate to the plant in Tsumeb.

Given that the quantity of copper concentrate imported is likely to increase by over 50%, with export quantities increasing accordingly, there will be a significant increase in the company's transport requirements. The smelter expansion will therefore create significant opportunities for the transport sector (road and rail).

The increase in production will also impact on the handling and storage operations at the Port of Walvis Bay, which are managed by Grindrod. The facility has been in operation since 1995 and employs 26 staff. Operations on the site are monitored by Namport. The facility is ISO 14 000, 18 000 and 9 000 certified, so is a well-run operation.

Based on information obtained from the operational manager ~ 235 000 tonnes were stored on the site in stockpiles during 2016. Of this total ~ 45-50 % of the material stored on site (105 000 tons), of which 90 000 tons goes to a cement factory at Otjiwarongo and the remaining 10-15 000 tons to DPMT. The remaining 50-55 % of the 235 000 tonnes is made up of concentrate destined for DPMT in Tsumeb. In terms of stockpiled material, on average 30 - 40 000 tonnes of DPMT concentrate is stored on site at any given time, and 40 000 tons of coal. In terms of current operations an average of one ship per month docks and is offloaded. The size of the ore carrier is around 30 000 tonnes. A 30 000 ton bulk ore carrier takes on average 8-10 days to offload.

The increase in production will result in an associated 50% increase in concentrate imported through the Port of Walvis Bay. More than one ore carrier per month will need to be offloaded, and this is likely to require additional staff to be employed at the Grindrod bulk handling facility. Grindrod currently relies on DPMT for a substantial portion of its turnover. The company will therefore be a key beneficiary from the expansion.

In addition to the benefits to local transport companies and Grindrod, local companies that currently provide engineering and maintenance services will also benefit from the expansion programme. For example Quant, which has 181 employees, relies on DPMT for ~ 50% of its turnover (Economic Assessment, 2016). Engineering service companies and suppliers, such as Quant, are likely to benefit from the proposed expansion.

Based on the findings of the Economic Assessment (Independent Economic Researchers, 2016), the total number of indirect jobs created by the expansion programme is expected to be in the region of 16-32. In terms of salaries, this would translate into N$4 million and N$8 million per annum. Of this total it is estimated that between N$1.7 million and N$3.5 million would be earned in Tsumeb.

The Tsumeb Municipality will also benefit from the expansion. The municipality currently generates ~ N$2.7 million per year from water sales to DPMT. This is expected to increase by ~ 20% due to the proposed expansion (Economic Assessment, 2016). This represents a major source of revenue for the municipality.

The local hospitality industry in Tsumeb will also benefit from the operational phase of the expanded smelter. In this regard senior management and contractors providing services to the smelter will require accommodation when they visit the smelter. These representatives will stay over in local hotels etc. The expansion of the DPMT smelter will therefore create a number of downstream benefits for both the local and national economy, which in turn will create employment and business opportunities.

Table 3.4: Impact assessment of employment and business creation opportunities during operational phase

Creation of employment and business opportunities during the operational phase	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**		**Severity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**
Severity/Nature: Positive socio-economic benefits associated with the creation of employment and business opportunities during the operational phase without and with enhancement benefits would be moderate **Duration:** Life of the project **Spatial scale:** Widespread, beyond the site boundary, including the town of Tsumeb, local region and country **Consequence:** Medium **Probability:** High with enhancement **Significance:** High Positive	M+	M	H	H	M	H+	**Objective:** To maximise employment and business opportunities, specifically for local Namibian companies **Actions:** Implement recommendations listed below.	M+	M	H	H	H	H+

Recommended enhancement measures

- The proponent should appoint local Namibian companies to undertake work associated with the operational phase where ever possible;
- The proponent, in consultation with the Tsumeb Municipality, should develop a database of local companies, specifically Small Medium and Micro Enterprises (SMME's) that qualify as potential service providers. These companies should be notified of the tender process and invited to bid for project-related work;
- Where possible, the proponent, in consultation with the Tsumeb Municipality, should assist local SMME companies to complete and submit the required tender forms and associated information.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the operational phase.

6.5.2 Benefits associated with DPM Community Trust

The DPMT Community Trust was established by DPMT to support local development in Tsumeb and the Oshikoto Region. The trust has five focus areas, namely:

- Education: 40% of the budget is allocated to supporting education initiatives;
- SMMEs: 30% of the budget is allocated to supporting the development of local SMMEs;
- Social Welfare: 15% of the budget is allocated to social welfare projects;
- Environment: 7.5% of the budget; and
- Arts and Culture: 7.5% of the budget.

The total spend linked to the trust over the last five years has been N$ 10.2 million. The main beneficiaries have been local schools and education facilities (N$ 5.74 million) and SMME's (N$ 2.48 million). The investment in education has ranged from upgrading facilities at schools, such as toilets, desks, etc., to providing extra lessons for Grade 10 students and training for kindergarten teachers.

In terms of SMMEs, a total of 83 SMMEs have benefited from the trust. Of this total, 70 are still operating, with 20 doing well, while the remaining 50 are struggling. The current annual budget for the trust is N$ 3.75 million. This is also supplemented with income generated from the sale of scrap metal. These sales only commenced in 2016 and have already generated in the region of N$ 300 000.00. In addition to the Community Trust, DPMT also allocates N$ 12 million to corporate social investment (CSI) per annum. This budget has been used to develop housing for its workers (N$ 7 million). A total of 67 houses have already been built for DPMT staff.

The feedback from key stakeholders, including representatives from the Tsumeb Municipality, Namibian Chamber of Commerce, Tsumeb Community Concerns Committee and Youth leaders, all indicated that the Community Trust has had a significant benefit for the town. The Community Trust had also raised the profile of DPMT within the community and the town. In terms of supporting SMMEs, it was recommended that DPMT should look at more effective ways to involve local SMMEs in its procurement programme, and also look at implementing mentorship and training programmes. In terms of local youth development, representatives from the Youth Leaders also recommended that DPMT should investigate the option of developing the old Tsumeb Club into a youth training and recreation centre.

Table 3.5: Assessment of benefit of Community Trust[5]

Benefits associated with Community Trust	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	Duration	Spatial Scale	Consequence	Probability	Significance		Severity	Duration	Spatial Scale	Consequence	Probability	Significance
Severity/Nature: Positive socio-economic benefits associated with the contribution of the Community Trust to local economic development and community initiatives. Without enhancement benefits would be Moderate. With enhancement the benefits are High. **Duration:** Life of the project **Spatial scale:** Fairly Widespread, beyond the site boundary, including the town of Tsumeb and local region **Consequence:** Medium **Probability:** High with enhancement **Significance:** High Positive	M+	M	M	M	H	M+	**Objective:** To maximise contribution of the Community Trust to benefit the local and regional economy **Actions:** The Community Trust should continue to monitor the needs of the community. The option of developing the Tsumeb Sports Club into a youth resource centre should be investigated	M+	M	M	M	H	M+

[5] The Community Trust has benefitted socio-economic development in Tsumeb and the local region (Moderate Benefit. It is assumed that the increase in production will create an opportunity to increase the annual budget of the Community Trust. This would also represent a Moderate Benefit.

6.5.3 Catalyst for development and investment

Representatives from the Tsumeb Municipality, Oshikoto Regional Council, Namibian Chamber of Commerce, Tsumeb Community Concerns Committee, Youth leaders and the National Union of Miners all indicated that the investment by DPMT in Tsumeb has had a significant positive impact on the town and the region.

The town has always been linked to the mine. The closure of the mine in late 1990's therefore had a significant impact on the local economy and led to a period of uncertainty. The old mine also created a dependency syndrome which exacerbated matters. The closure of the mine was followed by economic slumps in 2003 and 2008. The purchase of the smelter by DPMT in 2010 therefore represented a major investment in the town. The subsequent investment of N$ 3 billion to upgrade the old smelter and improve the environmental performance also represented a long term commitment by DPMT to the town and the region.

This commitment, and the associated 667 permanent jobs, was viewed by a number of the respondents as the catalyst for recent establishment of the Tsumeb Mall (N$ 120 million with an additional N$ 45 earmarked for further expansion). The Kuperquelle Resort at the southern entrance to the town has also invested close to N$ 100 million. All of these investments in the town would not have taken place if DPMT had not made a long term investment in the town. DPMT are also seen as the best company to work for as they pay the best wages and have the best pension and worker benefit schemes. This is despite the potential health risks associated with the operation of the smelter.

The investment by DPMT also provided the catalyst for TransNamib to upgrade the railway line been Tsumeb and Windhoek. TransNamib also invested in new rolling stock to meet the needs of DPMT and enable it to transport concentrate from Walvis Bay to Tsumeb. In addition to the benefits associated with the Community Trust, DPMT has also supported local events, such as the Copper Fest. The representative from the Tsumeb Municipality indicated that the event had grown over the last 3 years due to support from DPMT. The investment by DPMT has also resulted in an increase in property values in the town.

Table 3.6: Assessment of catalyst for development and investment

Catalyst for investment and development	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	Duration	Spatial Scale	Consequence	Probability	Significance		Severity	Duration	Spatial Scale	Consequence	Probability	Significance
Severity/Nature: Positive socio-economic benefits associated with the contribution of DPMT to development and investment in Tsumeb and Namibia. Without and without enhancement severity would be Moderate and High respectively. **Duration:** Life of the project **Spatial scale:** Widespread, beyond the site boundary, including the town of Tsumeb, local region and country **Consequence:** Medium **Probability:** High with enhancement **Significance:** High Positive	M+	M	H	H	M	H+	**Objective:** To maximise contribution of DPM to the local and national economy **Actions:** Implement recommendations listed below.	H+	M	H	H	H	H+

6.5.4 Health related impacts associated with SO_2 and H_2SO_4 emissions[6]

The potential health impacts associated with SO_2 and H_2SO_4 emissions was raised as the key concern by the majority of stakeholders interviewed as part of the SIA. While all of the stakeholders interviewed acknowledged that conditions had improved since the establishment and commissioning of the sulphuric acid plant in late 2015-early 2016, it became clear that local residents were still exposed to emission related incidents on a weekly basis.

In this regard a wide range of stakeholders and community members indicated that they were exposed to smell and associated health (coughing, sore throats, stinging eyes etc.) impacts associated with SO_2 and H_2SO_4 emissions on a weekly basis (1-3 times a week). These findings were confirmed by the findings of the HIA and AQIA.

The affected stakeholders and community members that indicated that they were exposed to weekly incidents included:

- Community members from the Ondundu residential area, located ~ 1.2km south of the smelter;
- Representatives from the Tsumeb Private Hospital, located ~ 1.4 km south of the smelter;
- The principal of the Tsumeb Gymnasium Private School, located ~ 1.4 km south of the smelter;
- Residents living in the vicinity of the Private Hospital, located ~ 1.4 km south of the site;
- Business owners in the Western Industrial Area, located 2.2 km west of the site;
- Representatives from the Tsumeb Municipality, Oshikoto Regional Council and Namibian Chamber of Commerce;
- Representatives from the Tsumeb Community Concerns Committee; and
- Youth leaders and representatives from the National Union of Miners.

All of the stakeholders confirmed the key role played by DPMT in terms of the local economy, specifically following the impact from the closure of the mine in 2008. However, the exposure to weekly emission related incidents on a weekly basis was a key concern.

In this regard teachers from Ondundu Primary school indicated that there were times when they had to close classroom windows and children were not allowed to go out and play due to the emissions. Children that did go outside returned to the class coughing and with their eyes watering. The problem is linked to wind directions, and is worse early in the mornings, late in the afternoons and in the evenings, when conditions are cooler and the emissions are closer to the ground level. The emissions can be seen as white cloud[7]. Rainy days when there is low cloud cover is also bad. In addition to health impacts, the emissions cause roofs, fences and window frames to rust.

[6] The focus of the SIA is on the potential impacts associated with associated with SO_2 and H_2SO_4 emissions. The Health Impact Assessment considers the potential impact of arsenic in detail.

[7] Based on the comments it was not clear if types of exposures had occurred since the establishment of the sulphuric acid plant in 2016. However, it was clear that the Ondundu Community was still exposed to emissions post the establishment of the plant.

Representatives from Afrox and Powerline Africa located in the Western Industrial Area ~ 2.2 km west of the smelter indicated that they experienced exposure events between 1-3 times a week. The representative from Afrox indicated that customers often come in coughing and wheezing after being affected by SO_2 emissions.

A local resident interviewed indicated that the plants in her garden were damaged and in some cases destroyed by the SO_2 emissions, and that on a number of occasions they have had to close their windows and turn off their air conditioners to prevent the SO_2 and H_2SO_4 emissions from entering the house.

The key findings of the HIA and AQIA that have a bearing on the SIA are summarised below:

Health Impact Assessment[8]

The HIA notes that, based on environmental air monitoring, Tsumeb can be seen to be experiencing relatively few, but nonetheless continuing monthly SO_2 exceedances of the World Health Organisation (WHO) limits since the installation of the Acid Plant at the smelter at the end of 2015. This is also confirmed by the results of the respiratory health questionnaire in the community health study. SO_2 has an irritant effect on the respiratory system causing a symptom burden of respiratory symptoms.

A survey of residents showed that compared with Oshakati (which is a completely unexposed control area) there is evidence of respiratory symptoms being significantly more prevalent in Tsumeb. This is also consistent with the 2012 Namibian Government Survey which found an excess of respiratory symptoms among Tsumeb residents in comparison with Grootfontein.

Asthma related symptoms

As part of the survey undertaken by the HIA, several questions were asked for respiratory symptoms intending to measure various proxies for asthma in order to examine the impact of SO_2 exposures on residents in different areas within Tsumeb. Of the 83 people (48% of those in the exposed areas) who experience wheezing in any form, 54 (64% of 83) have frequent episodes at least once weekly, which provides some idea of the severity. Forty (48% of the 83 who experience wheezing in any form) have frequent episodes and are breathless with the wheezing. Thirty nine (47% of the 83) have frequent episodes and wheeze in the absence of a cold with the wheezing attacks. Thirty (36% of the 83) have frequent episodes and wake up at night short of breath.

The HIA study found that compared with Oshakati there was evidence of asthma-related symptoms being significantly more prevalent in Tsumeb. This is consistent with the 2012 Namibian Government Survey[9] which found an excess of respiratory symptoms in Tsumeb in comparison with Grootfontein. So it can be inferred that there definitely is some asthma-related impact from exposure to SO_2 from the smelter, but that this is mostly mild to moderate. It must be noted that the sulphuric acid plant was not yet constructed at the time of the 2012 government survey. Since the commissioning of the acid plant, a drastic drop in SO_2 levels have

[8] Health Impact Assessment, Professor J Myer, December 2016
[9] Namibian Government survey, 2012

been experienced, with constant improvement in the gas capture of the acid plant since 2016.

Odour perception

The findings of the questionnaire survey found that there was an overwhelmingly prevalent perception of incidents of strong unpleasant odour in the air in all exposed areas. The typical frequency of bad odour was around once a week. This confirms the average of 4 to 5 SO_2 exceedances reported for the monitoring stations at Stadium and Information Centre for the period since the acid plant came on stream late in 2015. Before this it was much more frequent. This confirms and supports the findings of the SIA.

The responses to the questionnaire also confirmed many statements about improvements with regard to SO_2 exposures in the residential areas made by community members at the Town Hall meetings prior to this survey. Responses to the question of whether these incidents were more or less frequent, the overwhelming majority (82%) felt that they were less frequent in 2016 than 2015. At one of the meetings in Nomtsoub, community members indicated that there was a definite improvement and that their quality of life improved with the commissioning of the sulphuric acid plant. One community member indicated that birds had even returned to their gardens. Despite the improvement some parts of the town were still exposed to weekly incidents of perceiving an odour from SO_2 emissions.

Symptoms related to SO_2 exposure

Of the 161 who were aware of the smell, almost all i.e. 133 or (83%) were affected in some way physically by the smell. The HIA notes that "It is evident that there is an appreciable burden of physical effects of the SO_2 exceedances on the exposed population. The comparison with the vanishing level of these effects in unexposed Oshakati is striking".

The predominant symptoms are cough and throat irritation, which are upper respiratory system responses and compatible with respiratory irritation by SO_2. It is notable that the more severe lower respiratory symptoms, such as shortness of breath and chest discomfort are considerably less prevalent. This is consistent with the mild to moderate impact on asthma-related symptoms discussed above. Other upper respiratory symptoms are nasal discomfort and sneezing. Itchy throat discomfort was very common and experienced by the author of this report on all field days in Tsumeb, particularly in Endombo at the northern end of Nomtsoub and in the northern part of town in the commercial district.

All these findings are compatible with the measured SO_2 levels from the air monitoring stations at Stadium and Information Centre. The HIA notes that "while not severe, they do, however, impose some burden of discomfort on the residents in all areas of Tsumeb".

Assessment of impact associated with 54% increase in production

The HIA notes that based on current data the impact on either employees at the smelter or Tsumeb residents is estimated to be negligible to very low. The HIA also indicates that "it should be noted that the capital improvements are not yet fully implemented and these can be assumed to continue to result in reduced arsenic and SO_2 exposures going forward. Engineering down new arsenic and SO_2 exposures since January 2016 and which are associated with the introduction of new equipment (the new converters) and new methods (of slag cooling) may be expected to bring about further future reductions in exposure".

The HIA also notes that the shutdown of the arsenic plant in the first quarter of 2017 can be expected to result in a reduction of arsenic exposures for both occupational and environmental exposures below current levels. However, the study also notes that the shutdown of the arsenic plant will also result in some increase in waste destined for disposal. If this all ends up at the waste disposal site on the hill, the exposure situation there could continue and possibly increase proportionately by 54% as a worst-case scenario. DPMT is, however, currently still considering alternative disposal options for arsenic waste in order to limit the volumes of waste to be disposed of in the hazardous waste site and implemented measures to manage and monitor emissions from the hazardous waste site. This includes a vitrification plant where arsenic dust would be converted to an inert non-hazardous glass-like substance.

Air Quality Impact Assessment[10]

The AQIA considered two operational scenarios, namely:

- The base scenario which is representative of current activities and a concentrate processing rate of 240 000 t/a; and
- The project scenario which includes proposed plant upgrades and an increase to a concentrate processing rate of 370 000 t/a.

The base scenario (240 000 t/a) emissions for SO_2 PM_{10}, $PM_{2.5}$, arsenic and H_2SO_4 emissions were estimated at 16 438 t/a, 348.4 t/a, 219.3 t/a 9.9 t/a and 115.2 t/a respectively. For the expanded production scenario (370 000 t/a), the SO_2, PM_{10}, $PM_{2.5}$, arsenic and H_2SO_4 emissions were estimated to increase to 26 842 t/a, 430.8 t/a, 292.5 t/a, 15.0 t/a and 177.6 t/a respectively.

These represent significant increases (63.3 % increase for SO_2 23.7 % increase for PM_{10}, 33.4 % increase for $PM_{2.5}$, 51.2%% increase for arsenic and 54.2 % increase for H_2SO_4). The SO_2 emissions increase is most notable because of the introduction of the RHF where SO_2 will be released during charging and pouring. The PM_{10}, arsenic and H_2SO_4 emissions will increase mostly because of increased material throughput and production rates. The increase is expected to be proportional to the increase in the concentrate processing rate. The findings of the dispersion simulations, however, indicate that with a 90% acid plant utilisation (i.e. on line for at least 90% of the time while the Ausmelt furnace is active) off-site air quality limits or screening criteria (South African National Ambient Air Quality Standards) would not be exceeded outside the smelter boundary, but some spikes in the hourly SO_2 concentrations might still be experienced at the closest community at Ondundu. PM_{10}, $PM_{2.5}$ and H_2SO_4 levels for the proposed smelter expansion from 240 000 t/a to 370 000 t/a would also not exceed air quality limits offsite.

While the findings of the dispersion simulations indicated limited exceedances of air quality limits or screening criteria for SO_2, PM_{10}, arsenic and H_2SO_4 off-site for either the base or project scenarios, the significant increases should be viewed within the context of the findings of the SIA and HIA that, despite the establishment of the sulphuric acid plant in 2015, local residents still experienced exposure to SO_2 and H_2SO_4 on a weekly basis (between 1 and 3 times per week) at the time of the survey in 2016. While significantly fewer complaints regarding emissions have been

[10] Air Quality Impact Assessment, Airshed (May, 2018)

received since 2016, there are still some spikes in SO_2 emissions that are detected by residents in the northern parts of town during start-up and upset conditions at the acid plant.

The study does however note that simulated short term (1-hour and 24-hour) SO_2 and PM_{10} concentrations seem to be an underestimate of actual levels as represented by ambient air quality monitoring data. It is however known that the accuracy of dispersion models improves with increased averaging periods. The study also found that the base scenario ambient arsenic concentrations, both on and off-site (at the closest monitoring stations), exceed chronic screening criteria. Simulated ambient arsenic concentrations for the project scenario also exceeded chronic screening criteria at the closest air quality monitoring stations (Plant Hill and Sewerage Works) and at the closest residential areas of Ondundu and Endombo in the north of town. In terms of health risks related to arsenic, the findings of the study indicate that the increased lifetime cancer risk at Tsumeb is low (between one in a million and one in ten thousand) because of arsenic exposure through the inhalation pathway. This is based on a conservative study approach.

According to the HIA, the impact of arsenic on the receiving environment and nearby air quality sensitive receptors (AQSRs) is at the upper level of what might be considered acceptable both from a non-carcinogenic and carcinogenic inhalation health exposure perspective. The AQIA assessment therefore notes that it is essential that attention be paid to the reduction of arsenic-containing fugitive dust emissions, especially the handling and disposal of such dust at the hazardous waste disposal site post-closure of the arsenic plant. Furnace/converter building fugitive emissions is also a key item to be addressed.

In terms of the recommendations, the study indicates that there have been noteworthy improvements in ambient air quality in and around Tsumeb since 2014. This is especially true for ambient SO_2 levels. Further improvement in fugitive dust emissions and impacts are however necessary and will be incorporated into the smelter complex's existing air quality management plan. In addressing fugitive emissions, arsenic levels will also be reduced. The AQIA lists a number of mitigation measures to address the impacts.

In terms of significance, the base scenario was assessed to be of low to medium with the implementation of effective mitigation measures, especially for the control of arsenic containing dusts. The significance of the project scenario (370 000 t/a) was also assessed to be low to medium with effective mitigation. The AQIA notes that the expansion project will not change the significance of air quality impacts currently experienced.

In terms of mitigation measures, the bulk of the mitigation measures are aimed at addressing PM_{10} emissions (Fugitive Dust Control Measures). It is also recommended that at least a 90% utilisation rate be consistently achieved in order to ensure that SO_2 and H_2SO_4 levels remain below the air quality limits outside of the smelter boundary. It is noted that emissions from the proposed RHF holding furnace will be extracted and passed through a baghouse before being vented to atmosphere through a new baghouse stack. Both movable and stationary hoods will be employed at the RHF. It is essential that movable hoods be positioned correctly during all cycles of the process. It is further recommended that the height of the baghouse stack be at least 70 m above ground level. At a release height of 70 m, emissions released will result in ground level pollutant level no more than 25% of the ambient air quality limits.

The Acid Plant

The report also notes that SO_2 emissions have drastically reduced since the commissioning of the sulphuric acid plant. However, as indicated above, despite these reductions local residents are still exposed on a weekly basis. The AQIA notes that management and maintenance of systems feeding off-gas to the sulphuric acid plant, and the acid plant itself, is essential to maintaining improvements to SO_2 levels in the area. It will also ensure minimal H_2SO_4 emissions. As stated above, a 90% utilisation rate is required in order to ensure that SO2 levels remain below the air quality limits outside of the smelter boundary. A total process shutdown is recommended should the acid plant not be operational. If this is not feasible, it is recommended that interruptions of the acid plant operations be kept to a minimum between the hours of 11am and 4pm. This is the period during which emissions are most likely to reach ground level sensitive receptors. Continuous monitoring of emissions released through the acid plant stack is also recommended.

Concluding comments

While the findings of the AQIA and HIA study are not disputed, it is understandable that the public might find it extremely difficult to understand how an increase in SO_2, PM_{10}, arsenic and H_2SO_4 emissions by 83%, 18%, 53% and 42% respectively will not result in any change in the significance of the air quality and health impacts. In this regard it must be noted that extensive environmental improvements to smelter operations since DPMT purchased the smelter in 2010 have significantly reduced air emissions. Further continuous improvements in this regard through improved housekeeping and engineering interventions will further improve emission capture. Clear, open and regular public communications in this regard will be undertaken in order to inform the public.

While the projected emission levels for SO_2 and H_2SO_4 may not exceed accepted standards and therefore are not regarded as a health threat, the findings of the HIA clearly indicate that "It is evident that there is an appreciable burden of physical effects of the SO_2 exceedances on the exposed population". When one considers the findings of the AQIA, specifically the information reflected in the extracted figures below, which compare the simulated hourly exposure concentrations for SO_2 for current (240 000 t/a) and expanded (370 000 t/a) scenarios, it is clear that a larger area will be affected by the expanded production. The simulations indicate that only the northern parts of town would likely be exposed to levels above the hourly air quality limits. Based on this it is reasonable to assume that the frequency of incidents that result in asthma related symptoms and odours is therefore likely to increase in these areas should the acid plant not maintain at least a 90% utilisation rate.

In this regard the National Union of Miners (NUM) indicated that they would not support the proposed expansion unless the potential health risks associated with current and future operation of the smelter can be effectively addressed.

Given the findings of the HIA and the SIA it is recommended that a more detailed set of mitigation measures be prepared describing what steps will be taken to guarantee that the proposed 54% increase in production will not result in an increase of exposure exceedances.

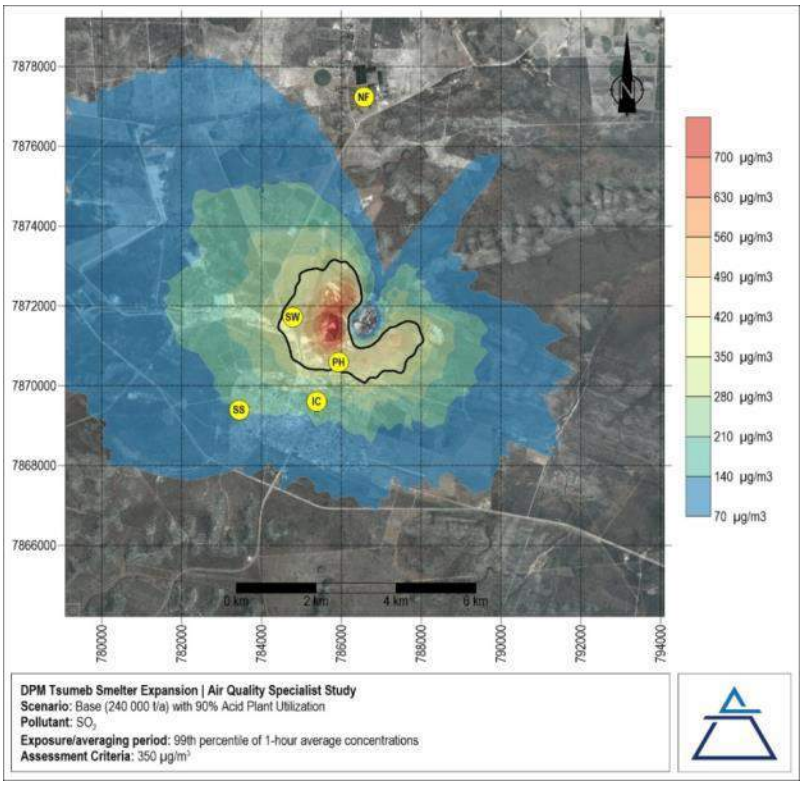


Figure 38: Base scenario, 99th percentile of simulated 1-hour SO_2 concentrations (90% acid plant utilization)(air quality limit of 350 µg/m³, is indicated with a black line)

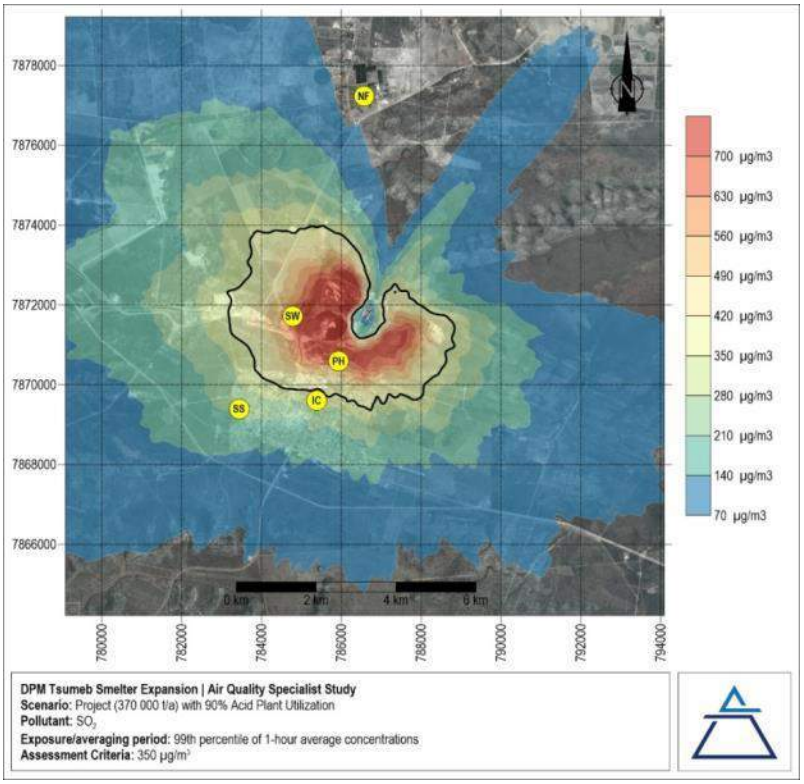


Figure 39: Project scenario, 99th percentile of simulated 1-hour SO_2 concentrations

Table 3.7: Assessment of air quality impacts on local community

Potential health impacts associated with emissions	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**		**Severity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**
Severity/Nature: Negative health impacts associated with exposure to smelter emissions. Without mitigation Moderate. With effective mitigation Low **Duration:** Life of the project **Spatial scale:** Fairly Widespread, beyond the site boundary, including the town of Tsumeb **Consequence:** Medium **Probability:** High with mitigation **Significance:** Low Negative with effective mitigation	M	M	M	M	H	M	**Objective:** To minimise exposure of community to emissions from smelter operations **Actions:** Implement recommendations listed below.	L/M	M	L/M	L/M	H	L/M

Recommended mitigation measures
The recommendations contained in the HIA and AQIA will need to be implemented. In addition, the AQIA and HIA specialists will be requested to provide more detailed information on how the increase in emissions will be effectively mitigated. In this regard DPMT should be required to provide guarantee that the increase in production by 54% will not result in an increase in the frequency and severity of exposure to SO_2, H_2SO_4 and arsenic emissions. This guarantee will be informed by a detailed and effective set of mitigation measures.

In addition DPMT should establish an Environmental Monitoring Committee (EMC) to monitor environmental issues, including health related issues, associated with the operation of the smelter. The EMC should consist of representatives from DPMT, Tsumeb Municipality, National Government, Local Community, Non-Government Organisations (NGOs) and Labour, ensuring adequate representation from women and residents of the medium exposure areas (Ondundu and Endombo). Where required, input from independent specialists (health and environmental) should be provided to assist the EMC to address issues of concern. The costs associated with the services provided by the independent specialists should be covered by DPMT. The EMC should be established within the next 6 months and should meet on quarterly basis or more frequently if required. The EMC should be provided with monitoring data from the air quality monitoring programme and also be made aware of all complaints submitted to DPMT.

6.5.5 Impacts associated with storage and transport of concentrate

As indicated above, concentrate is offloaded at the Grindrod bulk handing facility at the Port of Walvis Bay. The facility handles concentrate for DPMT and coal. In terms of the current operations, ~ 30-40 000 tonnes of copper concentrate is stored on site at any given time and 40 000 tons of coal. An average of one ore carrier (~ 30 000 tons) per month docks and is off loaded. The concentrate for DPMT currently comes from Chile and Bulgaria, with the material from Chile making up the bulk.

The key environmental issues include wind-blown dust and contaminated run-off. In this regard a local resident, Mr Johan Cornelison, who is also a Health and Safety consultant, and lives in the residential area to the south east of the site towards the lagoon, has raised concerns. Dust from the stockpiles was also raised as a concern by Salt Works in October 2014. The Salt Works stockpiles are located adjacent (north) to the Grindrod site and down-wind from the South Wester. An independent study found that the Salt Works site was contaminated with lead. This area used to be the storage area for ore from the old Tsumeb mine (used to be the Pb, Cu storage area, so historical contamination).

In order to reduce the impact of wind-blown dust and contaminated run-off the following management measures are in place:

- Offloading from ore carriers done via covered overhead conveyor belt lines direct to stockpile areas;
- Material has 8-10% moisture content to reduce dust;
- Stockpiled areas are concrete lined, and have sumps to collect contaminated run-off. Due to low rainfall contaminated run-off not a major problem;
- Trucks are covered and fitted with tarpaulins. This operation takes place off site once the trucks have been loaded.
- The facility is ISO 14 000, 18 000 and 9 000 certified, so is a good operation. The ISO certification also includes a dust collection and monitoring system in place on

the site. NamPort also have a dust monitoring system in place and monitor Grindrod's operations;
- The operations manager indicated that Material Safety Data Sheets (MSDS) are not provided for all shipments. An ISO audit is due in September, and one of the requirements is information on the chemical composition of the concentrate. MSDS will therefore need to be provided;
- Mr Dirkie Smallberger, an environmental officer for Grindrod, manages the system and visits the site from SA every 2 months;
- Worker health is monitored on a yearly basis. It includes blood testing for arsenic and lead and lung X rays for coal dust. Monitoring is done by local health and safety company, OX Nam. Levels of arsenic have been picked up in blood samples;
- All workers wear masks on site; and
- Workers shower on site after work and overalls are cleaned by the company.

In addition, Grindrod and DPMT are looking at a new system to reduce environmental and health risks, material arrives in bulk, then looking at loading into bags, before loading onto trucks. Material from conveyor backs would be loaded directly into bags, and bags would be stockpiled as opposed to open, exposed concentrate. Bags would be 14 tons. This would reduce dust from stockpiles and also from transport, also reduce risk of contaminated run-off.

The potential impacts associated with the transport of concentrate from the Port of Walvis Bay to Tsumeb are linked to safety issues posed by large trucks and dust. In terms of safety issues, the National Logistics Master Plan identifies Walvis Bay as a key component of the development of an Namibia as an International Logistics Hub. The plan also involves expanding the port and the volume of traffic through the port. The volume of heavy traffic along the road between Walvis Bay and Tsumeb is therefore likely to increase. This increase is also supported by the vision to establish Namibia as an International Logistics Hub. Therefore, while the increase in in production will result in an increase in the volume of heavy trucks, this increase is inevitable and is supported by the vision to develop Namibia as a logistic hub.

The Master Plan also notes that the road and rail transport system does not meet international standards and identifies the need to upgrade key sections of trunk roads. Of relevance to the DPMT smelter expansion project the report recommends that the following roads need to be upgraded:

- Trunk road between Swakopmund–Karibib;
- Trunk road between Karibib– Otjiwarongo.

This will assist to reduce potential safety issues. Increasing the percentage of concentrate transported by rail would also significantly reduce the potential safety risks posed to other road users. The use of rail will also reduce the damage to roads caused by heavily loaded vehicles. This would represent a social benefit for other road users. In this regard it is also worth noting that the two national roads affected by DPMT related traffic, namely the B2 (Walvis Bay-Okahandja) and B1 (Windhoek-Okahandja-Tsumeb), are also key access roads for tourists, in that they link Windhoek with the coast and also provide access to Etosha Pan and Caprivi region. Given the importance of tourism to the national economy it is recommended that the option of using rail be considered as a key mitigation measure to reduce the potential safety impacts associated with transporting concentrate by truck.

Table 3.8: Impacts associated with transport and storage of concentrate

Potential impacts associated with storage and transport of concentrate	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	Duration	Spatial Scale	Consequence	Probability	Significance		Severity	Duration	Spatial Scale	Consequence	Probability	Significance
Severity/Nature: Negative health and impacts associated with storage and transport of concentrate. Without mitigation Moderate. With effective mitigation Low **Duration:** Life of the project **Spatial scale:** Fairly widespread, beyond the site boundary, including the town of Tsumeb, local region **Consequence:** Medium **Probability:** Low with mitigation **Significance:** Low Negative with effective mitigation	M	M	M	M	M	M	**Objective:** To minimise impacts associated with storage and transport of concentrate **Actions:** Implement recommendations listed below.	L	M	M	L	L	L

Recommended mitigation measures
Grindrod and DMPT should implement proposed option of loading concentrate into bags for storage and transport. In addition, efforts should be made to increase percentage of concentrate transported by rail.

6.6 SOCIAL IMPACTS ASSOCIATED WITH DECOMMISSIONING PHASE

Given the relatively high number of permanent employees (667) the potential impacts associated with decommissioning will be significant. The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities.

The impacts for the households who are directly affected by the retrenchment and loss of income associated with decommissioning include the inability to pay bills (such as household bonds, lights, water and property rates, buy food, pay school fees, etc.). Despite every effort to manage the decommissioning process, some employees who lose their jobs may feel that they let their families down. The resultant loss of self-esteem can cause depression and maybe even result in suicide in some cases. Retrenchments can therefore have a significant impact on the directly affected households.

The impact on communities in which the people live can also be severely impacted upon by loss of jobs associated with decommissioning. The impacts include increase in crime, alcohol and drug abuse, decreased economic activity, etc. The experience in mining towns such as Arandis highlights these impacts. Likewise, local authorities can also be severely affected by the loss of jobs and related income at the local and regional levels associated with decommissioning. The impacts are linked to the inability of residents to pay bills, increased crime, alcohol and drug abuse, etc. All of these issues impact on the ability of the local authorities to provide a living environment that is conducive to the community's well-being.

In the absence of an effective plan to manage the social and economic impacts associated with smelter closure and decommissioning the impacts will be significant. However, the potential impacts associated with the decommissioning phase can be effectively managed with the implementation of an effective and well planned retrenchment and downscaling programme as well as the implementation of a suitable closure plan. This could reduce the significance to Medium to Low Negative.

Table 3.9: Social impacts associated with decommissioning

Potential impacts associated with decommissioning	Unmitigated assessment						Mitigation/management measures	Enhanced / Mitigated assessment					
	Severity	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**		**Severity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**
Severity/Nature: Negative social impacts associated with loss of employment due to decommissioning. Without mitigation Moderate. With effective mitigation Low **Duration:** Reversible **Spatial scale:** Localised Widespread **Consequence:** Low **Probability:** High without mitigation **Significance:** Low Negative with effective mitigation	H	H	M	H	H	H	**Objective:** To minimise impacts associated with job losses during decommissioning **Actions:** Implement recommendations listed below.	M	M	M	M	M	M

Recommended mitigation measures

In order to mitigate the negative impacts associated with job losses that may arise from decommissioning the following mitigation measures are recommended:

- DPMT must ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the smelter is closed;
- DPMT must carry out a market needs assessment in view of developing a targeted skills training programme;
- DPMT must implement a skills training programme to equip employees with skills they can use when the smelter closes. The skills development programme should be designed to take into account current education and skills levels of employees. The skills training programme should be implemented from the outset of the operational phase and should be funded by DPMT;
- DPMT must provide employees with a basic financial management course to enable them to make informed decisions with regard to investing their earnings; and
- DPMT must establish an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas, including the hazardous waste site and associated arsenic contamination. The Trust Fund should be funded by a percentage of the revenue generated from the sale of produce during the operational phase of the smelter.

6.7 ASSESSMENT OF NO-DEVELOPMENT OPTION

The No-Development option would represent a lost opportunity for the towns of Tsumeb, the region and Namibia to benefit from the employment and economic opportunities associated with the expanded operation of the DPMT smelter. This loss would represent a negative social impact for the local community, especially in an area of Namibia where employment opportunities are limited. The No-Development option is therefore not supported. However, the potential community and worker health risks must be effectively addressed before the expansion project proceeds.

However, it should be noted that the current operation of the smelter also creates significant socio-economic benefits, and that these benefits will continue if the expansion programme does not proceed.

7 CONCLUSION AND RECOMMENDATIONS

Based on the findings of the SIA, the proposed expansion of the DPMT smelter will create economic opportunities for Tsumeb, the Oshikoto Region and the broader Namibia economy. The expansion of the smelter is therefore supported. In order to enhance the local employment and business opportunities, the mitigation measures listed in the report should be implemented. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented.

The key negative impact associated with the smelter expansion is linked to the health risks posed by the increase in emissions. While the findings of the HIA and AQIA indicate that the projected emission levels for SO_2 and H_2SO_4 will not exceed accepted standards and are therefore not regarded as a significant health threat, the findings of the HIA and SIA indicate that the residents of Tsumeb are exposed to weekly exposures of SO_2 and H_2SO_4. In this regard, the HIA notes that "there is an appreciable burden of physical effects of the SO_2 exceedances on the exposed population".

Therefore, while the findings of the AQIA and HIA study are not disputed, the public are likely to find it extremely difficult to understand how an increase in $SO_{2,}$ $PM_{10,}$ arsenic and H_2SO_4 emissions by 63%, 33%, 51% and 54% respectively will not result in any change in the significance of the air quality and health impacts. In this regard, the Stakeholder Engagement Plan must include a specific component for addressing these uncertainties in a transparent, accessible and understandable format.

Given the findings of the SIA and the HIA it is recommended that a more detailed set of mitigation measures be prepared describing what steps will be taken to guarantee that the proposed 54% increase in production will not result in an increase of exposure exceedances. DPMT should also provide guarantees that the frequency and severity of SO_2 and H_2SO_4 emissions will not increase as a result of the smelter expansion programme. This guarantee should be informed by a detailed and effective set of mitigation measures. DPMT should also establish an Environmental Monitoring Committee as per the recommendations contained in the SIA.

Annexure A

1. Definition of social impacts

Social impacts can be defined as "The consequences to human populations of any public or private actions (these include policies, programmes, plans and/or projects) that alter the ways in which people live, work, play, relate to one another, organise to meet their needs and generally live and cope as members of society. These impacts are felt at various levels, including individual level, family or household level, community, organisation or society level. Some social impacts are felt by the body as a physical reality, while other social impacts are perceptual or emotional" (Vanclay, 2002).

One of the key challenges facing SIAs does not necessarily involve the physical disruption of human populations, but understanding the meanings, perceptions and/or social significance of these changes. The social construction of reality is a characteristic of all social groups, including the agencies that attempt to implement changes, as well as the communities that are affected (Guidelines and Principles for Social Impact Assessment, 1994). The tendency of development agencies and proponents to dismiss the concerns of others as being merely imagined and perceived is therefore a key issue that needs to be addressed by social impact assessments.

The challenges that SIA faces associated with "social construct of reality" are further compounded by the dominance of technocratic rationality as the established approach to natural resource decision-making and assessment (Burdge and Vanclay, 1995). In order to understand the role of social assessment in the EIA process one needs to define what social impacts are. This issue is complicated by the way in which different people from different cultural, ethnic, religious, gender, and educational backgrounds, etc. view the world. This is referred to as the "social construct of reality". The social construct of reality informs people's worldview and the way in which they react to changes. However, in many instances these constructs are frequently treated as perceptions or emotions, to be distinguished from "reality."

Technocratic rationality dominates the current approach to the way in which EIA's are undertaken and assessed. This approach focuses on "measuring, predicting and reporting" on the impacts of proposals in order to objectively investigate alternatives and select the course of action with "the greatest net benefits for society" (Formby, 1990). The approach is favoured by engineers and natural scientists who are often uncomfortable with, or about, the involvement of what they regard to be an ill-informed public (Dugdale and West, 1991). However, despite the emphasis on objectivity, technocratic rationality is ill-equipped to deal either with the competing interests, beliefs, values and aspirations that characterize complex social situations, or with the active participation of multiple stakeholders in working through these situations (Lockie, 2003). However, Rickson et al (1998), however, argue that this is not just about conflicting worldviews, but also about power. It is about whose definition of an impact, an aspiration, a value and a fact are considered legitimate and whose is dismissed as subjective, emotional and irrelevant (Lockie *et al*, 1999). The quantifiable, technocratic rationality approach empowers governments and developers by highlighting positive impacts, such as regional economic and employment opportunities, while ignoring issues that cannot be measured within affected communities and the subjective and cultural meanings for these communities (Burdge and Vanclay, 1995; Lockie *et al*, 1999). SIA therefore has a

critical role to play in ensuring that the needs and concerns of affected and vulnerable individuals and communities are included in the decision-making process. SIA therefore plays an important role in empowering communities (Barbour, 2007).

SIA's should enable the authorities, project proponents, individuals, communities and organizations to understand and be in a position to identify and anticipate the potential social consequences of the implementation of a proposed policy, programme, plan or project. The SIA process should also alert communities and individuals to the proposed project and possible social impacts, while at the same time allowing them to assess the implications and identify potential alternatives. The assessment process should also alert proponents and planners to the likelihood and nature of social impacts and enable them to anticipate and predict these impacts in advance so that the findings and recommendations of the assessment are incorporated into and inform the planning and decision-making process (Barbour, 2007).

2. Timing of social impacts

Social impacts vary in both time and space. In terms of timing, all projects and policies go through a series of phases, usually starting with initial planning, followed by implementation (construction), operation, and finally closure (decommissioning). The activities, and hence the type and duration of the social impacts associated with each of these phases are likely to differ.

Annexure B

List of the secondary information reviewed and interviews conducted

INTERVIEWS

Tuesday 17 May 2016

- Representatives from Namibia Chamber of Commerce & Industries (NCCI): Andreas Apollus, Joram Awasab, Jackie Sanjath, Andre Struwig, Kalina Howases, Sharon Guriab, Felix Uirab, Clementine Kanyaku;
- Representatives from the Ondundu Community: Pastor Fillipus Naunyango, Hans Dai-Gaib, Nico Gramoset, Christine Hanes, William Pineas, Mesias Angala, Timoteuse Hiholiwe, Peter Beyer.
- Representatives (2) from the Tsumeb Municipality: Glen Kearns (Manager of Health), Mr Sitikela (ex-Mayor);
- Representatives (4) from the Tsumbeb Community Concerns Committee: Moses Awiseb, Albert Neidec, Martha Kanandjemba, Wilka Thomas

Wednesday 18 May 2016

- Principal of the Tsumeb Gymnasium Private School: Mr Wouter Niehuas;
- Mr Andre Neetling, Tsumeb Private Hospital;
- Representative from Tsumeb branch of Afrox Namibia; Ms Letiechia von FLowtow
- Representatives (10) from the MUN/NUNW unions: Frans Kamati, John Hinyekwa, Hilia Makuti, Julia Kambunga, Fredrick Hlifanali, Rafael Uugwanga, Christian Ntjambo, Brian Tjihero, Jonas.
- Representative from Regional Constituency Councillor's Office: Ms Lovisa Ilyambo, Head of Administration.

Thursday 19 May 2016

- Andre Struwig, Dundee Precious Metals Community Trust;
- Representatives from the Shack Dwellers Association of Namibia: Hilma Shiluka, Dennis Cooper, Klania Howoses, Fransina Thobais, Inekela IIyambo, Violine Karindjima, Juliana Somses;
- Representatives from National Youth Council: Shlula Hilma, Elias Haufiku, Jacob Wilhelm, Chantel Kaebozu, Stella Imalwa, Edison Utale, Andrew Shililifa, Zenecia Nghitamuka.
- Representatives from the Tsumeb Private Hospital: Ms Ansie Hannekom and Ms Helena du Plessis;
- Representative from NAMFO: Deon Benade;
- Representative from Powerline Africa: Francois Schoebee;
- Mr and Mrs Kuehl, local residents.

Monday 23 May 2016 (Walvis Bay)

- Representative from Blaauws Transport: Mr Piet Bonzaier;
- Representatives (2) from Grindrod Terminals: Mr Jonny Ferreira.

PRINTED SOURCES

- Airshed (January 2017): Air Quality Impact Assessment for DPM Smelter Expansion Project;
- Economic Researchers (December 2016): Economic Impact Assessment for DPM Smelter Expansion Project, Independent

- Professor J Myer (December 2016, 2019 update): Health Impact Assessment for DPM Smelter Expansion Project;
- Japan International Cooperation Agency (JICA), March 2015: master plan for development of an international logistics hub for SADC countries in the Republic of Namibia, Final Report Summary, March 2015
- Ministry of Trade and Industry: Namibia's Industrial Policy
- Namibia National Development Plan 4 (2012/13 to 2016/17)
- Namibia Vision 2030 (adopted in 2004);
- Yarmoshuk, A. 2015. Tsumeb Community Needs Assessment. Report prepared for DPMT. Aaron Yarmoshuk, Canada;

ONLINE SOURCES

https://www.iwgia.org/en/namibia
www.constructionreviewonline.com - Construction of US $1bn Tsumeb Smart City in Namibia to commence
https://ippr.org.na/publication/landscaping-gender-based-violence-in-namibia/ - Landscaping Gender-Based Violence in Namibia (2018)

Annexure C

Assessment methodology

PART A: DEFINITION AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE					
			SEVERITY = L		
DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**
			SEVERITY = M		
DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**
			SEVERITY = H		
DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
			SPATIAL SCALE		
PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	**High**
	Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= low and + denotes a positive impact.**

ANNEXURE D

Key groups and individuals consulted during the site visit

Monday 16 May 2016
- Representatives from Dundee Precious Metals (16/05/16)

Tuesday 17 May 2016
- Representatives from Namibia Chamber of Commerce & Industries (NCCI);
- Representatives from the Ondundu Community;
- Representatives from the Tsumeb Municipality;
- Representatives from the Tsumeb Community Concerns Committee.

Wednesday 18 May 2016
- Principal of the Tsumeb Gymnasium Private School;
- Mr Andre Neethling, Tsumeb Private Hospital;
- Representative from Tsumeb branch of Afrox Namibia;
- Representatives from the MUN/NUNW unions;
- Representative from Regional Constituency Councillor's Office.

Thursday 19 May 2016
- Andre Struwig, Dundee Precious Metals Community Trust;
- Representatives from the Shack Dwellers Association of Namibia;
- Representatives from National Youth Council;
- Representatives from the Tsumeb Private Hospital;
- Representative from NAMFO;
- Representative from Powerline Africa;
- Mr and Mrs Kuehl, local residents.

Friday 20 May 2016
- Report back meeting to Dundee Precious Metals and members of the Board.

Monday 23 May 2016 (Walvis Bay)
- Representative from Blaauws Transport;
- Representatives from Grindrod Terminals.